EXHIBIT 51

Table 1. Educational Attainment of the Population 18 Years and Over, by Age, Sex, Race, and Hispanic Origin: 2019

(Numbers in thousands. Civilian noninstitutionalized population.[1])

All Races	Educational Attainment															
	Total	None	1st - 4th grade	5th - 6th grade	7th - 8th grade	9th grade	10th grade	11th grade[2]	High school graduate	Some college, no degree	Associate's degree, occupational	Associate's degree, academic	Bachelor's degree	Master's degree	Professional degree	Doctoral degree
Both Sexes																
18 years and over	250,563	834	1,469	3,163	3,413	3,604	3,958	10,118	70,947	45,028	10,381	14,168	53,312	22,459	3,150	4,557
18 to 24 years	29,085	66	57	52	101	240	562	3,508	8,688	10,338	641	1,171	3,375	245	14	28
25 years and over	221,478	769	1,412	3,111	3,312	3,365	3,397	6,611	62,259	34,690	9,741	12,998	49,937	22,214	3,136	4,529
25 to 29 years	23,277	72	41	112	132	233	254	667	6,089	4,243	978	1,438	6,823	1,803	171	221
30 to 34 years	21,932	42	77	212	223	250	275	675	5,549	3,287	1,018	1,305	5,904	2,294	360	461
35 to 39 years	21,443	63	118	274	229	390	343	598	5,184	2,984	1,009	1,265	5,515	2,643	299	530
40 to 44 years	19,584	76	107	339	293	367	258	550	4,990	2,737	834	1,215	4,671	2,361	330	455
45 to 49 years	20,345	75	114	334	268	342	251	589	5,299	3,000	935	1,327	4,785	2,229	313	484
50 to 54 years	20,355	62	102	298	274	335	270	665	5,831	3,059	936	1,270	4,492	2,075	295	393
55 to 59 years	21,163	54	151	347	283	311	366	700	6,374	3,370	1,007	1,307	4,348	1,908	266	370
60 to 64 years	20,592	65	140	318	289	273	318	640	6,423	3,223	924	1,355	4,051	1,867	329	375
65 to 69 years	17,356	68	121	243	264	251	278	439	4,927	3,042	776	1,009	3,495	1,775	262	404
70 to 74 years	14,131	55	143	168	247	178	261	383	4,130	2,346	556	765	2,693	1,560	240	405
75 years and over	21,301	137	298	466	809	435	522	705	7,462	3,398	767	740	3,160	1,699	271	431
Male																
18 years and over	121,301	410	743	1,653	1,653	1,769	2,014	5,377	36,076	21,500	4,809	5,949	25,206	9,721	1,827	2,596
18 to 24 years	14,605	32	38	29	47	148	291	1,928	4,819	4,909	321	501	1,421	100	7	16
25 years and over	106,695	378	705	1,624	1,607	1,621	1,723	3,449	31,257	16,591	4,488	5,448	23,785	9,621	1,820	2,580
25 to 29 years	11,792	39	28	60	83	123	138	387	3,416	2,227	436	644	3,302	734	80	96
30 to 34 years	10,935	39	41	119	117	120	155	380	3,178	1,632	454	547	2,841	858	216	238
35 to 39 years	10,629	33	75	149	115	217	198	330	2,951	1,512	501	516	2,566	1,068	141	255
40 to 44 years	9,628	51	69	180	128	184	161	266	2,740	1,350	413	580	2,136	966	161	241
45 to 49 years	9,993	36	54	178	142	188	126	348	2,940	1,472	456	605	2,070	985	141	253
50 to 54 years	9,930	27	42	156	154	159	141	372	3,057	1,514	425	519	2,072	901	155	237
55 to 59 years	10,046	31	68	214	146	164	197	388	3,116	1,443	484	507	2,065	854	162	206
60 to 64 years	9,819	19	66	175	135	111	149	325	3,171	1,487	438	533	1,949	817	223	220
65 to 69 years	8,198	32	49	115	121	130	118	211	2,212	1,489	335	384	1,779	790	184	248
70 to 74 years	6,691	10	66	80	113	72	119	153	1,753	1,099	257	329	1,459	769	146	266
75 years and over	9,034	60	145	197	353	153	219	290	2,724	1,366	290	285	1,545	877	211	321
Female																
18 years and over	129,262	425	726	1,510	1,760	1,836	1,945	4,742	34,872	23,528	5,572	8,220	28,106	12,738	1,324	1,960
18 to 24 years	14,479	34	19	23	55	92	271	1,580	3,870	5,429	320	670	1,954	145	7	12
25 years and over	114,783	391	707	1,487	1,705	1,744	1,674	3,162	31,002	18,099	5,252	7,550	26,151	12,593	1,317	1,948
25 to 29 years	11,485	33	12	52	49	110	116	281	2,674	2,015	542	795	3,521	1,069	91	125
30 to 34 years	10,997	3	36	93	106	129	120	295	2,372	1,655	565	758	3,063	1,436	145	223
35 to 39 years	10,814	29	43	125	115	173	145	268	2,232	1,472	507	749	2,949	1,574	158	275
40 to 44 years	9,956	24	37	158	165	183	97	284	2,250	1,388	421	635	2,535	1,395	170	213
45 to 49 years	10,351	39	60	156	126	153	126	241	2,359	1,527	479	723	2,716	1,244	172	232
50 to 54 years	10,425	35	60	142	120	176	129	293	2,774	1,545	511	752	2,420	1,174	139	156
55 to 59 years	11,117	24	83	133	137	147	169	312	3,258	1,927	522	801	2,282	1,054	103	164
60 to 64 years	10,773	46	75	143	154	163	168	315	3,252	1,736	486	822	2,102	1,050	106	156
65 to 69 years	9,158	36	72	128	143	121	160	228	2,715	1,554	442	625	1,716	985	79	156
70 to 74 years	7,440	45	77	88	134	106	142	231	2,377	1,247	300	436	1,235	791	94	138
75 years and over	12,267	77	153	269	457	283	303	416	4,739	2,033	477	455	1,614	822	59	111

A dash (-) represents zero or rounds to zero.

[1] Plus armed forces living off post or with their families on post.

[2] Respondents who have completed 12th grade but did not receive a diploma are included in this category.

Details may not sum to totals due to rounding.

Source: U.S. Census Bureau, Current Population Survey, 2019 Annual Social and Economic Supplement

For more information on confidentiality protection, sampling error, nonsampling error, and definitions, see <https://www2.census.gov/programs-surveys/cps/techdocs/cpsmar19.pdf>

EXHIBIT 52

Murder Victims

by Weapon, 2014–2018

Download Excel

Weapons	2014	2015	2016	2017	2018
Total	**12,278**	**13,780**	**15,318**	**15,195**	**14,123**
Total firearms:	7,803	9,103	10,372	11,006	10,265
Handguns	5,342	6,176	6,762	7,051	6,603
Rifles	235	215	300	390	297
Shotguns	238	247	247	264	235
Other guns	88	151	172	180	167
Firearms, type not stated	1,900	2,314	2,891	3,121	2,963
Knives or cutting instruments	1,545	1,525	1,558	1,609	1,515
Blunt objects (clubs, hammers, etc.)	431	436	464	472	443
Personal weapons (hands, fists, feet, etc.)[1]	668	647	664	710	672
Poison	9	8	12	15	5
Explosives	6	1	1	0	4
Fire	55	63	78	96	72
Narcotics	70	69	118	110	78
Drowning	12	12	9	8	9
Strangulation	84	96	97	89	70
Asphyxiation	93	105	92	111	90
Other weapons or weapons not stated	1,502	1,715	1,853	969	900

- [1] Pushed is included in personal weapons.
- NOTE: The Uniform Crime Reporting Technical Refresh enables updating of prior years' crime data; therefore, data presented in this table may not match previously published data.

EXHIBIT 53

An Updated Assessment of the Federal Assault Weapons Ban: Impacts on Gun Markets and Gun Violence, 1994-2003

Report to the National Institute of Justice, United States Department of Justice

By

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With

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June 2004

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PREFACE

Gun violence continues to be one of America's most serious crime problems. In 2000, over 10,000 persons were murdered with firearms and almost 49,000 more were shot in the course of over 340,000 assaults and robberies with guns (see the Federal Bureau of Investigation's annual *Uniform Crime Reports* and Simon et al., 2002). The total costs of gun violence in the United States – including medical, criminal justice, and other government and private costs – are on the order of at least $6 to $12 billion per year and, by more controversial estimates, could be as high as $80 billion per year (Cook and Ludwig, 2000).

However, there has been good news in recent years. Police statistics and national victimization surveys show that since the early 1990s, gun crime has plummeted to some of the lowest levels in decades (see the *Uniform Crime Reports* and Rennison, 2001). Have gun controls contributed to this decline, and, if so, which ones?

During the last decade, the federal government has undertaken a number of initiatives to suppress gun crime. These include, among others, the establishment of a national background check system for gun buyers (through the Brady Act), reforms of the licensing system for firearms dealers, a ban on juvenile handgun possession, and Project Safe Neighborhoods, a collaborative effort between U.S. Attorneys and local authorities to attack local gun crime problems and enhance punishment for gun offenders.

Perhaps the most controversial of these federal initiatives was the ban on semiautomatic assault weapons and large capacity ammunition magazines enacted as Title XI, Subtitle A of the *Violent Crime Control and Law Enforcement Act of 1994*. This law prohibits a relatively small group of weapons considered by ban advocates to be particularly dangerous and attractive for criminal purposes. In this report, we investigate the ban's impacts on gun crime through the late 1990s and beyond. This study updates a prior report on the short-term effects of the ban (1994-1996) that members of this research team prepared for the U.S. Department of Justice and the U.S. Congress (Roth and Koper, 1997; 1999).

ACKNOWLEDGMENTS

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The author wishes to thank several people and organizations that assisted this effort in numerous ways. Daniel Woods assisted with data analysis. Jeffrey Roth, who directed our first study of the assault weapons ban, provided advice and editorial input. Additional research assistance was provided by the following former employees of the Urban Institute: Gretchen Moore, David Huffer, Erica Dinger, Darin Reedy, Kate Bunting, Katie Gorie, and Michele Waul. The following persons and organizations provided databases, information, or other resources utilized for this report: Glenn Pierce (Northeastern University), Pamela Shaw and Edward Koch (Baltimore Police Department), Robert Shem (Alaska State Police), Bill McGill and Mallory O'Brien (currently or formerly of the Firearm Injury Center, Medical College of Wisconsin), Rick Ruddell (California State University, Chico), Scott Doyle (Kentucky State Police), Terrence Austin and Joe Vince (currently or formerly of the Bureau of Alcohol, Tobacco, Firearms, and Explosives), Carlos Alvarez and Alan Lynn (Metro-Dade Police Department), Charles Branas (Firearm and Injury Center, University of Pennsylvania), Caroline Harlow (Bureau of Justice Statistics), and Rebecca Knox (Brady Center to Prevent Handgun Violence). Robert Burrows (Bureau of Alcohol, Tobacco, Firearms, and Explosives) and Wain Roberts (Wain Roberts Firearms) shared technical expertise on firearms. Anonymous reviewers for the National Institute of Justice provided thorough and helpful comments on earlier versions of this report, as did Terrence Austin and Robert Burrows of the Bureau of Alcohol, Tobacco, Firearms, and Explosives. Finally, I thank Lois Mock, our National Institute of Justice grant monitor, for her advice and encouragement throughout all of the research that my colleagues and I have conducted on the assault weapons ban.

1. IMPACTS OF THE FEDERAL ASSAULT WEAPONS BAN, 1994-2003: KEY FINDINGS AND CONCLUSIONS

This overview presents key findings and conclusions from a study sponsored by the National Institute of Justice to investigate the effects of the federal assault weapons ban. This study updates prior reports to the National Institute of Justice and the U.S. Congress on the assault weapons legislation.

The Ban Attempts to Limit the Use of Guns with Military Style Features and Large Ammunition Capacities

- Title XI, Subtitle A of the Violent Crime Control and Law Enforcement Act of 1994 imposed a 10-year ban on the "manufacture, transfer, and possession" of certain semiautomatic firearms designated as assault weapons (AWs). The ban is directed at semiautomatic firearms having features that appear useful in military and criminal applications but unnecessary in shooting sports or self-defense (examples include flash hiders, folding rifle stocks, and threaded barrels for attaching silencers). The law bans 18 models and variations by name, as well as revolving cylinder shotguns. It also has a "features test" provision banning other semiautomatics having two or more military-style features. In sum, the Bureau of Alcohol, Tobacco, Firearms, and Explosives (ATF) has identified 118 models and variations that are prohibited by the law. A number of the banned guns are foreign semiautomatic rifles that have been banned from importation into the U.S. since 1989.

- The ban also prohibits most ammunition feeding devices holding more than 10 rounds of ammunition (referred to as large capacity magazines, or LCMs). An LCM is arguably the most functionally important feature of most AWs, many of which have magazines holding 30 or more rounds. The LCM ban's reach is broader than that of the AW ban because many non-banned semiautomatics accept LCMs. Approximately 18% of civilian-owned firearms and 21% of civilian-owned handguns were equipped with LCMs as of 1994.

- The ban exempts AWs and LCMs manufactured before September 13, 1994. At that time, there were upwards of 1.5 million privately owned AWs in the U.S. and nearly 25 million guns equipped with LCMs. Gun industry sources estimated that there were 25 million pre-ban LCMs available in the U.S. as of 1995. An additional 4.7 million pre-ban LCMs were imported into the country from 1995 through 2000, with the largest number in 1999.

- Arguably, the AW-LCM ban is intended to reduce gunshot victimizations by limiting the national stock of semiautomatic firearms with large ammunition capacities – which enable shooters to discharge many shots rapidly – and other features conducive to criminal uses. The AW provision targets a relatively small number of weapons based on features that have little to do with the weapons'

operation, and removing those features is sufficient to make the weapons legal. The LCM provision limits the ammunition capacity of non-banned firearms.

The Banned Guns and Magazines Were Used in Up to A Quarter of Gun Crimes Prior to the Ban

- AWs were used in only a small fraction of gun crimes prior to the ban: about 2% according to most studies and no more than 8%. Most of the AWs used in crime are assault pistols rather than assault rifles.

- LCMs are used in crime much more often than AWs and accounted for 14% to 26% of guns used in crime prior to the ban.

- AWs and other guns equipped with LCMs tend to account for a higher share of guns used in murders of police and mass public shootings, though such incidents are very rare.

The Ban's Success in Reducing Criminal Use of the Banned Guns and Magazines Has Been Mixed

- Following implementation of the ban, the share of gun crimes involving AWs declined by 17% to 72% across the localities examined for this study (Baltimore, Miami, Milwaukee, Boston, St. Louis, and Anchorage), based on data covering all or portions of the 1995-2003 post-ban period. This is consistent with patterns found in national data on guns recovered by police and reported to ATF.

- The decline in the use of AWs has been due primarily to a reduction in the use of assault pistols (APs), which are used in crime more commonly than assault rifles (ARs). There has not been a clear decline in the use of ARs, though assessments are complicated by the rarity of crimes with these weapons and by substitution of post-ban rifles that are very similar to the banned AR models.

- However, the decline in AW use was offset throughout at least the late 1990s by steady or rising use of other guns equipped with LCMs in jurisdictions studied (Baltimore, Milwaukee, Louisville, and Anchorage). The failure to reduce LCM use has likely been due to the immense stock of exempted pre-ban magazines, which has been enhanced by recent imports.

It is Premature to Make Definitive Assessments of the Ban's Impact on Gun Crime

- Because the ban has not yet reduced the use of LCMs in crime, we cannot clearly credit the ban with any of the nation's recent drop in gun violence. However, the ban's exemption of millions of pre-ban AWs and LCMs ensured that the effects

of the law would occur only gradually. Those effects are still unfolding and may not be fully felt for several years into the future, particularly if foreign, pre-ban LCMs continue to be imported into the U.S. in large numbers.

The Ban's Reauthorization or Expiration Could Affect Gunshot Victimizations, But Predictions are Tenuous

- Should it be renewed, the ban's effects on gun violence are likely to be small at best and perhaps too small for reliable measurement. AWs were rarely used in gun crimes even before the ban. LCMs are involved in a more substantial share of gun crimes, but it is not clear how often the outcomes of gun attacks depend on the ability of offenders to fire more than ten shots (the current magazine capacity limit) without reloading.

- Nonetheless, reducing criminal use of AWs and especially LCMs could have non-trivial effects on gunshot victimizations. The few available studies suggest that attacks with semiautomatics – including AWs and other semiautomatics equipped with LCMs – result in more shots fired, more persons hit, and more wounds inflicted per victim than do attacks with other firearms. Further, a study of handgun attacks in one city found that 3% of the gunfire incidents resulted in more than 10 shots fired, and those attacks produced almost 5% of the gunshot victims.

- Restricting the flow of LCMs into the country from abroad may be necessary to achieve desired effects from the ban, particularly in the near future. Whether mandating further design changes in the outward features of semiautomatic weapons (such as removing all military-style features) will produce measurable benefits beyond those of restricting ammunition capacity is unknown. Past experience also suggests that Congressional discussion of broadening the AW ban to new models or features would raise prices and production of the weapons under discussion.

- If the ban is lifted, gun and magazine manufacturers may reintroduce AW models and LCMs, perhaps in substantial numbers. In addition, pre-ban AWs may lose value and novelty, prompting some of their owners to sell them in undocumented secondhand markets where they can more easily reach high-risk users, such as criminals, terrorists, and other potential mass murderers. Any resulting increase in crimes with AWs and LCMs might increase gunshot victimizations for the reasons noted above, though this effect could be difficult to measure.

2. PROVISIONS OF THE ASSAULT WEAPONS BAN

2.1. Assault Weapons

Enacted on September 13, 1994, Title XI, Subtitle A of the *Violent Crime Control and Law Enforcement Act of 1994* imposes a 10-year ban on the "manufacture, transfer, and possession" of certain semiautomatic firearms designated as assault weapons (AWs).[1] The AW ban is not a prohibition on all semiautomatics. Rather, it is directed at semiautomatics having features that appear useful in military and criminal applications but unnecessary in shooting sports or self-defense. Examples of such features include pistol grips on rifles, flash hiders, folding rifle stocks, threaded barrels for attaching silencers, and the ability to accept ammunition magazines holding large numbers of bullets.[2] Indeed, several of the banned guns (e.g., the AR-15 and Avtomat Kalashnikov models) are civilian copies of military weapons and accept ammunition magazines made for those military weapons.

As summarized in Table 2-1, the law specifically prohibits nine narrowly defined groups of pistols, rifles, and shotguns. A number of the weapons are foreign rifles that the federal government has banned from importation into the U.S. since 1989. Exact copies of the named AWs are also banned, regardless of their manufacturer. In addition, the ban contains a generic "features test" provision that generally prohibits other semiautomatic firearms having two or more military-style features, as described in Table 2-2. In sum, the federal Bureau of Alcohol, Tobacco, Firearms, and Explosives (ATF) has identified 118 model and caliber variations that meet the AW criteria established by the ban.[3]

Figures 2-1 and 2-2 illustrate a few prominent AWs and their features. Figure 2-1 displays the Intratec TEC-9 assault pistol, the AW most frequently used in crime (e.g., see Roth and Koper 1997, Chapter 2). Figure 2-2 depicts the AK-47 assault rifle, a weapon of Soviet design. There are many variations of the AK-47 produced around the world, not all of which have the full complement of features illustrated in Figure 2-2.

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[1] A semiautomatic weapon fires one bullet for each squeeze of the trigger. After each shot, the gun automatically loads the next bullet and cocks itself for the next shot, thereby permitting a somewhat faster rate of fire relative to non-automatic firearms. Semiautomatics are not to be confused with fully automatic weapons (i.e., machine guns), which fire continuously as long as the trigger is held down. Fully automatic weapons have been illegal to own in the United States without a federal permit since 1934.

[2] Ban advocates stress the importance of pistol grips on rifles and heat shrouds or forward handgrips on pistols, which in combination with large ammunition magazines enable shooters to discharge high numbers of bullets rapidly (in a "spray fire" fashion) while maintaining control of the firearm (Violence Policy Center, 2003). Ban opponents, on the other hand, argue that AW features also serve legitimate purposes for lawful gun users (e.g., see Kopel, 1995).

[3] This is based on AWs identified by ATF's Firearms Technology Branch as of December 1997.

Table 2-1. Firearms Banned by the Federal Assault Weapons Ban

Firearm	Description	1993 Blue Book Price	Pre-Ban Federal Legal Status	Examples of Legal Substitutes
Avtomat Kalashnikov (AK) (by Norinco, Mitchell, Poly Technologies)	Chinese, Russian, other foreign and domestic: .223 or 7.62x39mm caliber, semiauto. rifle; 5, 10, or 30 shot magazine, may be supplied with bayonet	$550 (generic import); add 10-15% for folding stock models	Imports banned in 1989.	Norinco NHM 90/91 [1]
Uzi, Galil	Israeli: 9mm, .41, or .45 caliber semiauto. carbine, mini-carbine, or pistol. Magazine capacity of 16, 20, or 25, depending on model and type (10 or 20 on pistols).	$550-$1050 (Uzi) $875-$1150 (Galil)	Imports banned in 1989	Uzi Sporter [2]
Beretta AR-70	Italian: .222 or .223 caliber semiauto. paramilitary design rifle; 5, 8, or 30 shot magazine.	$1050	Imports banned in 1989.	
Colt AR-15	Domestic: primarily .223 caliber paramilitary rifle or carbine; 5 shot magazines, often comes with two 5-shot detachable magazines. Exact copies by DPMS, Eagle, Olympic, and others.	$825-$1325	Legal (civilian version of military M-16)	Colt Sporter, Match H-Bar, Target models
Fabrique National FN/FAL, FN/LAR, FNC	Belgian design: .308 caliber semiauto. rifle or .223 combat carbine with 30 shot magazine. Rifle comes with flash hider, 4 position fire selector on automatic models. Discontinued in 1988.	$1100-$2500	Imports banned in 1989.	L1A1 Sporter (FN, Century) [2]
Steyr AUG	Austrian: .223/5.56mm caliber semiauto. paramilitary design rifle.	$2500	Imports banned in 1989	
SWD M-10, 11, 11/9, 12	Domestic: 9mm, .380, or .45 caliber paramilitary design semiauto. pistol; 32 shot magazine. Also available in semiauto. carbine and fully automatic variations.	$215 (M-11/9)	Legal	Cobray PM11, 12
TEC-9, DC9, 22	Domestic: 9mm caliber semiauto. paramilitary design pistol, 10 or 32 shot magazine.; .22 caliber semiauto. paramilitary design pistol, 30 shot magazine.	$145-$295	Legal	TEC-AB
Revolving Cylinder Shotguns	Domestic: 12 gauge, 12 shot rotary magazine; paramilitary configuration	$525 (Street Sweeper)	Legal	

[1] Imports were halted in 1994 under the federal embargo on the importation of firearms from China.
[2] Imports banned by federal executive order, April 1998.

Table 2-2. Features Test of the Federal Assault Weapons Ban

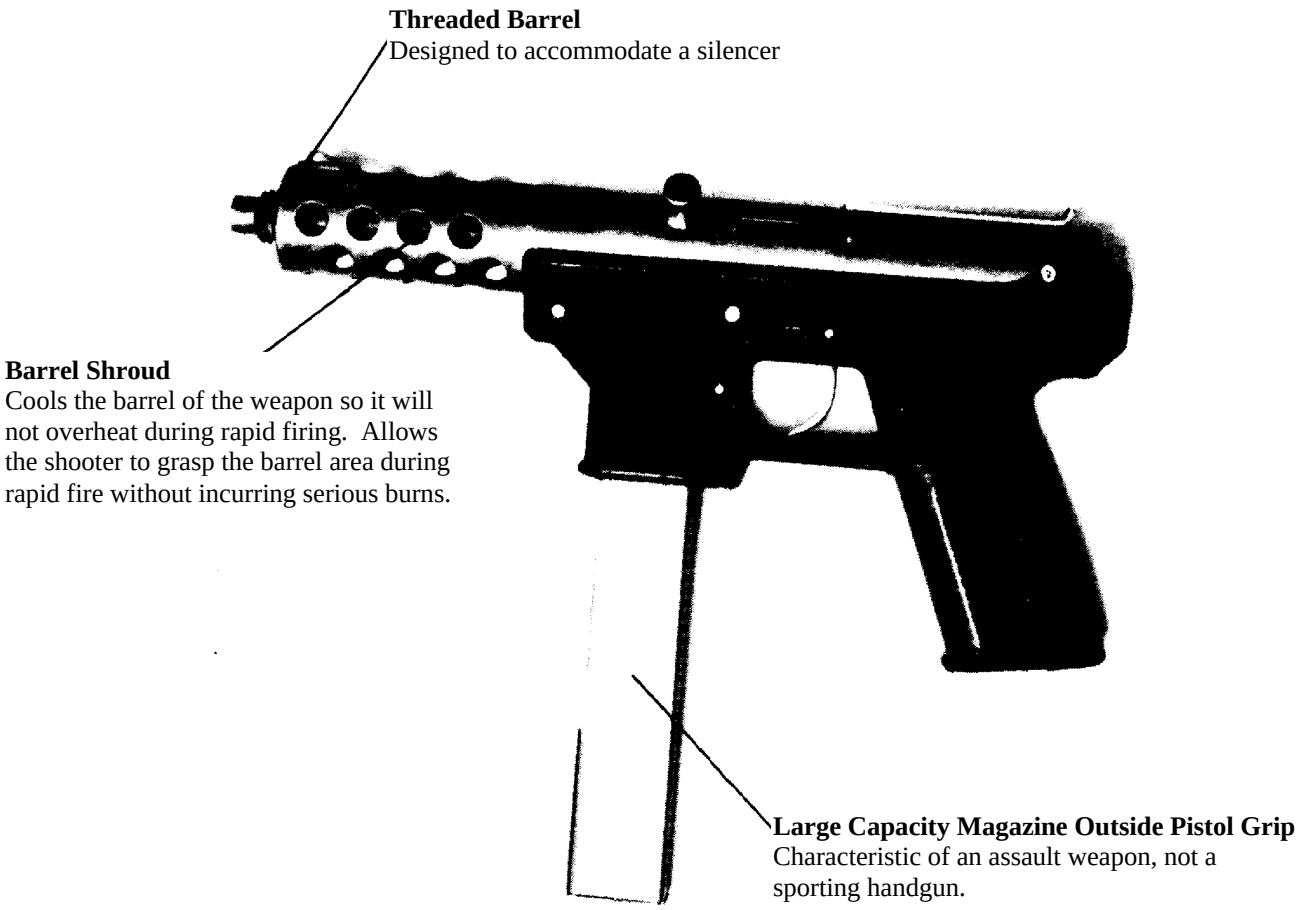
Weapon Category	Military-Style Features (Two or more qualify a firearm as an assault weapon)
Semiautomatic pistols accepting detachable magazines:	1) ammunition magazine that attaches outside the pistol grip 2) threaded barrel capable of accepting a barrel extender, flash hider, forward handgrip, or silencer 3) heat shroud attached to or encircling the barrel 4) weight of more than 50 ounces unloaded 5) semiautomatic version of a fully automatic weapon
Semiautomatic rifles accepting detachable magazines:	1) folding or telescoping stock 2) pistol grip that protrudes beneath the firing action 3) bayonet mount 4) flash hider or threaded barrel designed to accommodate one 5) grenade launcher
Semiautomatic shotguns:	1) folding or telescoping stock 2) pistol grip that protrudes beneath the firing action 3) fixed magazine capacity over 5 rounds 4) ability to accept a detachable ammunition magazine

2.2. Large Capacity Magazines

In addition, the ban prohibits most ammunition feeding devices holding more than 10 rounds of ammunition (referred to hereafter as large capacity magazines, or LCMs).[4] Most notably, this limits the capacity of detachable ammunition magazines for semiautomatic firearms. Though often overlooked in media coverage of the law, this provision impacted a larger share of the gun market than did the ban on AWs. Approximately 40 percent of the semiautomatic handgun models and a majority of the semiautomatic rifle models being manufactured and advertised prior to the ban were sold with LCMs or had a variation that was sold with an LCM (calculated from Murtz et al., 1994). Still others could accept LCMs made for other firearms and/or by other manufacturers. A national survey of gun owners found that 18% of all civilian-owned firearms and 21% of civilian-owned handguns were equipped with magazines having 10 or more rounds as of 1994 (Cook and Ludwig, 1996, p. 17). The AW provision did not affect most LCM-compatible guns, but the LCM provision limited the capacities of their magazines to 10 rounds.

[4] Technically, the ban prohibits any magazine, belt, drum, feed strip, or similar device that has the capacity to accept more than 10 rounds or ammunition, or which can be readily converted or restored to accept more than 10 rounds of ammunition. The ban exempts attached tubular devices capable of operating only with .22 caliber rimfire (i.e., low velocity) ammunition.

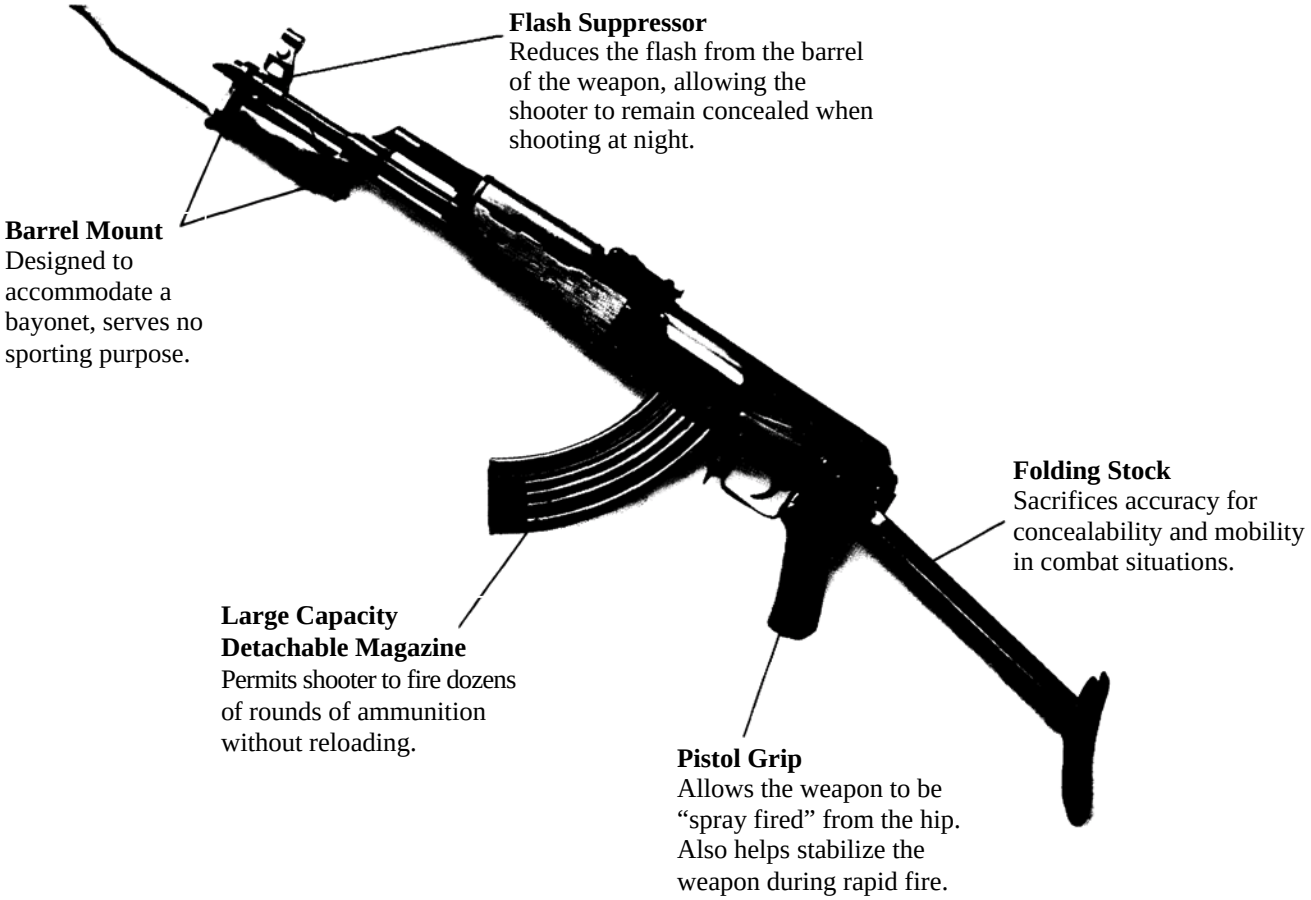
Figure 2-1. Features of Assault Weapons:
The Intratec TEC-9 Assault Pistol



Adapted from exhibit of the Center to Prevent Handgun Violence.

As discussed in later chapters, an LCM is perhaps the most functionally important feature of many AWs. This point is underscored by the AW ban's exemptions for semiautomatic rifles that cannot accept a detachable magazine that holds more than five rounds of ammunition and semiautomatic shotguns that cannot hold more than five rounds in a fixed or detachable magazine. As noted by the U.S. House of Representatives, most prohibited AWs came equipped with magazines holding 30 rounds and could accept magazines holding as many as 50 or 100 rounds (U.S. Department of the Treasury, 1998, p. 14). Also, a 1998 federal executive order (discussed below) banned further importation of foreign semiautomatic rifles capable of accepting LCMs made for military rifles. Accordingly, the magazine ban plays an important role in the logic and interpretations of the analyses presented here.

Figure 2-2. Features of Assault Weapons: The AK-47 Assault Rifle



Adapted from exhibit of the Center to Prevent Handgun Violence.

2.3. Foreign Rifles Accepting Large Capacity Military Magazines

In April of 1998, the Clinton administration broadened the range of the AW ban by prohibiting importation of an additional 58 foreign semiautomatic rifles that were still legal under the 1994 law but that can accept LCMs made for military assault rifles like the AK-47 (U.S. Department of the Treasury, 1998).[5] Figure 2-3 illustrates a few such rifles (hereafter, LCMM rifles) patterned after the banned AK-47 pictured in Figure 2-2. The LCMM rifles in Figure 2-3 do not possess the military-style features incorporated into the AK-47 (such as pistol grips, flash suppressors, and bayonet mounts), but they accept LCMs made for AK-47s.[6]

[5] In the civilian context, AWs are semiautomatic firearms. Many semiautomatic AWs are patterned after military firearms, but the military versions are capable of semiautomatic and fully automatic fire.

[6] Importation of some LCMM rifles, including a number of guns patterned after the AK-47, was halted in 1994 due to trade sanctions against China (U.S. Department of the Treasury, 1998).

Figure 2-3. Foreign Semiautomatic Rifles Capable of Accepting Large Capacity Military Magazines: AK47 Copies Banned by Executive Order in 1998

MISR

ARM

MAK90

WUM 1

Taken from U.S. Department of the Treasury (1998)

2.4. Ban Exemptions

2.4.1. Guns and Magazines Manufactured Prior to the Ban

The ban contains important exemptions. AWs and LCMs manufactured before the effective date of the ban are "grandfathered" and thus legal to own and transfer. Around 1990, there were an estimated 1 million privately owned AWs in the U.S. (about 0.5% of the estimated civilian gun stock) (Cox Newspapers, 1989, p. 1; American Medical Association Council on Scientific Affairs, 1992), though those counts probably did not correspond exactly to the weapons prohibited by the 1994 ban. The leading domestic AW producers manufactured approximately half a million AWs from 1989 through 1993, representing roughly 2.5% of all guns manufactured in the U.S. during that time (see Chapter 5).

We are not aware of any precise estimates of the pre-ban stock of LCMs, but gun owners in the U.S. possessed an estimated 25 million guns that were equipped with LCMs or 10-round magazines in 1994 (Cook and Ludwig, 1996, p. 17), and gun industry sources estimated that, including aftermarket items for repairing and extending magazines, there were at least 25 million LCMs available in the United States as of 1995 (Gun Tests, 1995, p. 30). As discussed in Chapter 7, moreover, an additional 4.8 million pre-ban LCMs were imported into the U.S. from 1994 through 2000 under the grandfathering exemption.

2.4.2. Semiautomatics With Fewer or No Military Features

Although the law bans "copies or duplicates" of the named gun makes and models, federal authorities have emphasized exact copies. Relatively cosmetic changes, such as removing a flash hider or bayonet mount, are sufficient to transform a banned weapon into a legal substitute, and a number of manufacturers now produce modified, legal versions of some of the banned guns (examples are listed in Table 2-1). In general, the AW ban does not apply to semiautomatics possessing no more than one military-style feature listed under the ban's features test provision.[7] For instance, prior to going out of business, Intratec, makers of the banned TEC-9 featured in Figure 2-1, manufactured an AB-10 ("after ban") model that does not have a threaded barrel or a barrel shroud but is identical to the TEC-9 in other respects, including the ability to accept an ammunition magazine outside the pistol grip (Figure 2-4). As shown in the illustration, the AB-10 accepts grandfathered, 32-round magazines made for the TEC-9, but post-ban magazines produced for the AB-10 must be limited to 10 rounds.

[7] Note, however, that firearms imported into the country must still meet the "sporting purposes test" established under the federal Gun Control Act of 1968. In 1989, ATF determined that foreign semiautomatic rifles having any one of a number of named military features (including those listed in the features test of the 1994 AW ban) fail the sporting purposes test and cannot be imported into the country. In 1998, the ability to accept an LCM made for a military rifle was added to the list of disqualifying features. Consequently, it is possible for foreign rifles to pass the features test of the federal AW ban but not meet the sporting purposes test for imports (U.S. Department of the Treasury, 1998).

Another example is the Colt Match Target H-Bar rifle (Figure 2-5), which is a legalized version of the banned AR-15 (see Table 2-1). AR-15 type rifles are civilian weapons patterned after the U.S. military's M-16 rifle and were the assault rifles most commonly used in crime before the ban (Roth and Koper, 1997, Chapter 2). The post-ban version shown in Figure 2-5 (one of several legalized variations on the AR-15) is essentially identical to pre-ban versions of the AR-15 but does not have accessories like a flash hider, threaded barrel, or bayonet lug. The one remaining military feature on the post-ban gun is the pistol grip. This and other post-ban AR-15 type rifles can accept LCMs made for the banned AR15, as well as those made for the U.S. military's M-16. However, post-ban magazines manufactured for these guns must hold fewer than 11 rounds.

The LCMM rifles discussed above constituted another group of legalized AW-type weapons until 1998, when their importation was prohibited by executive order. Finally, the ban includes an appendix that exempts by name several hundred models of rifles and shotguns commonly used in hunting and recreation, 86 of which are semiautomatics. While the exempted semiautomatics generally lack the military-style features common to AWs, many take detachable magazines, and some have the ability to accept LCMs.[8]

2.5. Summary

In the broadest sense, the AW-LCM ban is intended to limit crimes with semiautomatic firearms having large ammunition capacities – which enable shooters to discharge high numbers of shots rapidly – and other features conducive to criminal applications. The gun ban provision targets a relatively small number of weapons based on outward features or accessories that have little to do with the weapons' operation. Removing some or all of these features is sufficient to make the weapons legal. In other respects (e.g., type of firing mechanism, ammunition fired, and the ability to accept a detachable magazine), AWs do not differ from other legal semiautomatic weapons. The LCM provision of the law limits the ammunition capacity of non-banned firearms.

[8] Legislators inserted a number of amendments during the drafting process to broaden the consensus behind the bill (Lennett 1995). Among changes that occurred during drafting were: dropping a requirement to register post-ban sales of the grandfathered guns, dropping a ban on "substantial substitutes" as well as "exact copies" of the banned weapons, shortening the list of named makes and models covered by the ban, adding the appendix list of exempted weapons, and mandating the first impact study of the ban that is discussed below.

Figure 2-4. Post-Ban, Modified Versions of Assault Weapons: The Intratec AB ("After Ban") Model (See Featured Firearm)

Figure 2-5. Post-Ban, Modified Versions of Assault Weapons: The Colt Match Target HBAR Model

3. CRIMINAL USE OF ASSAULT WEAPONS AND LARGE CAPACITY MAGAZINES BEFORE THE BAN

During the 1980s and early 1990s, AWs and other semiautomatic firearms equipped with LCMs were involved in a number of highly publicized mass murder incidents that raised public concern about the accessibility of high powered, military-style weaponry and other guns capable of discharging high numbers of bullets in a short period of time (Cox Newspapers, 1989; Kleck, 1997, pp.124-126,144; Lenett, 1995). In one of the worst mass murders ever committed in the U.S., for example, James Huberty killed 21 persons and wounded 19 others in a San Ysidro, California MacDonald's restaurant on July 18, 1984 using an Uzi carbine, a shotgun, and another semiautomatic handgun. On September 14, 1989, Joseph Wesbecker, armed with an AK-47 rifle, two MAC-11 handguns, and a number of other firearms, killed 7 persons and wounded 15 others at his former workplace in Louisville, Kentucky before taking his own life. Another particularly notorious incident that precipitated much of the recent debate over AWs occurred on January 17, 1989 when Patrick Purdy used a civilian version of the AK-47 military rifle to open fire on a schoolyard in Stockton, California, killing 5 children and wounding 29 persons.

There were additional high profile incidents in which offenders using semiautomatic handguns with LCMs killed and wounded large numbers of persons. Armed with two handguns having LCMs (and reportedly a supply of extra LCMs), a rifle, and a shotgun, George Hennard killed 22 people and wounded another 23 in Killeen, Texas in October 1991. In a December 1993 incident, a gunman named Colin Ferguson, armed with a handgun and LCMs, opened fire on commuters on a Long Island train, killing 5 and wounding 17.

Indeed, AWs or other semiautomatics with LCMs were involved in 6, or 40%, of 15 mass shooting incidents occurring between 1984 and 1993 in which six or more persons were killed or a total of 12 or more were wounded (Kleck, 1997**,** pp.124-126, 144**).** Early studies of AWs, though sometimes based on limited and potentially unrepresentative data, also suggested that AWs recovered by police were often associated with drug trafficking and organized crime (Cox Newspapers, 1989; also see Roth and Koper, 1997, Chapter 5), fueling a perception that AWs were guns of choice among drug dealers and other particularly violent groups. All of this intensified concern over AWs and other semiautomatics with large ammunition capacities and helped spur the passage of AW bans in California, New Jersey, Connecticut, and Hawaii between 1989 and 1993, as well as the 1989 federal import ban on selected semiautomatic rifles. Maryland also passed AW legislation in 1994, just a few months prior to the passage of the 1994 federal AW ban.[9]

Looking at the nation's gun crime problem more broadly, however, AWs and LCMs were used in only a minority of gun crimes prior to the 1994 federal ban, and AWs were used in a particularly small percentage of gun crimes.

[9] A number of localities around the nation also passed AW bans during this period.

3.1. Criminal Use of Assault Weapons

Numerous studies have examined the use of AWs in crime prior to the federal ban. The definition of AWs varied across the studies and did not always correspond exactly to that of the 1994 law (in part because a number of the studies were done prior to 1994). In general, however, the studies appeared to focus on various semiautomatics with detachable magazines and military-style features. According to these accounts, AWs typically accounted for up to 8% of guns used in crime, depending on the specific AW definition and data source used (e.g., see Beck et al., 1993; Hargarten et al., 1996; Hutson et al., 1994; 1995; McGonigal et al., 1993; New York State Division of Criminal Justice Services, 1994; Roth and Koper, 1997, Chapters 2, 5, 6; Zawitz, 1995). A compilation of 38 sources indicated that AWs accounted for 2% of crime guns on average (Kleck, 1997, pp.112, 141-143).[10]

Similarly, the most common AWs prohibited by the 1994 federal ban accounted for between 1% and 6% of guns used in crime according to most of several national and local data sources examined for this and our prior study (see Chapter 6 and Roth and Koper, 1997, Chapters 5, 6):

- Baltimore (all guns recovered by police, 1992-1993): 2%
- Miami (all guns recovered by police, 1990-1993): 3%
- Milwaukee (guns recovered in murder investigations, 1991-1993): 6%
- Boston (all guns recovered by police, 1991-1993): 2%
- St. Louis (all guns recovered by police, 1991-1993): 1%
- Anchorage, Alaska (guns used in serious crimes, 1987-1993): 4%
- National (guns recovered by police and reported to ATF, 1992-1993): 5%[11]
- National (gun thefts reported to police, 1992-Aug. 1994): 2%
- National (guns used in murders of police, 1992-1994): 7-9%[12]
- National (guns used in mass murders of 4 or more persons, 1992-1994): 4-13%[13]

Although each of the sources cited above has limitations, the estimates consistently show that AWs are used in a small fraction of gun crimes. Even the highest

[10] The source in question contains a total of 48 estimates, but our focus is on those that examined all AWs (including pistols, rifles, and shotguns) as opposed to just assault rifles.

[11] For reasons discussed in Chapter 6, the national ATF estimate likely overestimates the use of AWs in crime. Nonetheless, the ATF estimate lies within the range of other presented estimates.

[12] The minimum estimate is based on AW cases as a percentage of all gun murders of police. The maximum estimate is based on AW cases as a percentage of cases for which at least the gun manufacturer was known. Note that AWs accounted for as many as 16% of gun murders of police in 1994 (Roth and Koper, 1997, Chapter 6; also see Adler et al., 1995).

[13] These statistics are based on a sample of 28 cases found through newspaper reports (Roth and Koper, 1997, Appendix A). One case involved an AW, accounting for 3.6% of all cases and 12.5% of cases in which at least the type of gun (including whether the gun was a handgun, rifle, or shotgun and whether the gun was a semiautomatic) was known. Also see the earlier discussion of AWs and mass shootings at the beginning of this chapter.

estimates, which correspond to particularly rare events such mass murders and police murders, are no higher than 13%. Note also that the majority of AWs used in crime are assault pistols (APs) rather than assault rifles (ARs). Among AWs reported by police to ATF during 1992 and 1993, for example, APs outnumbered ARs by a ratio of 3 to 1 (see Chapter 6).

The relative rarity of AW use in crime can be attributed to a number of factors. Many AWs are long guns, which are used in crime much less often than handguns. Moreover, a number of the banned AWs are foreign weapons that were banned from importation into the U.S. in 1989. Also, AWs are more expensive (see Table 2-1) and more difficult to conceal than the types of handguns that are used most frequently in crime.

3.1.1. A Note on Survey Studies and Assault Weapons

The studies and statistics discussed above were based primarily on police information. Some survey studies have given a different impression, suggesting substantial levels of AW ownership among criminals and otherwise high-risk juvenile and adult populations, particularly urban gang members (Knox et al., 1994; Sheley and Wright, 1993a). A general problem with these studies, however, is that respondents themselves had to define terms like "military-style" and "assault rifle." Consequently, the figures from these studies may lack comparability with those from studies with police data. Further, the figures reported in some studies prompt concerns about exaggeration of AW ownership (perhaps linked to publicity over the AW issue during the early 1990s when a number of these studies were conducted), particularly among juvenile offenders, who have reported ownership levels as high as 35% just for ARs (Sheley and Wright, 1993a).[14]

Even so, most survey evidence on the actual use of AWs suggests that offenders rarely use AWs in crime. In a 1991 national survey of adult state prisoners, for example, 8% of the inmates reported possessing a "military-type" firearm at some point in the past (Beck et al., 1993, p. 19). Yet only 2% of offenders who used a firearm during their conviction offense reported using an AW for that offense (calculated from pp. 18, 33), a figure consistent with the police statistics cited above. Similarly, while 10% of adult inmates and 20% of juvenile inmates in a Virginia survey reported having owned an AR, none of the adult inmates and only 1% of the juvenile inmates reported having carried them at crime scenes (reported in Zawitz, 1995, p. 6). In contrast, 4% to 20% of inmates surveyed in eight jails across rural and urban areas of Illinois and Iowa reported having used an AR in committing crimes (Knox et al., 1994, p. 17). Nevertheless, even assuming the accuracy and honesty of the respondents' reports, it is not clear what

[14] As one example of possible exaggeration of AW ownership, a survey of incarcerated juveniles in New Mexico found that 6% reported having used a "military-style rifle" against others and 2.6% reported that someone else used such a rifle against them. However, less than 1% of guns recovered in a sample of juvenile firearms cases were "military" style guns (New Mexico Criminal Justice Statistical Analysis Center, 1998, pp. 17-19; also see Ruddell and Mays, 2003).

weapons they were counting as ARs, what percentage of their crimes were committed with ARs, or what share of all gun crimes in their respective jurisdictions were linked to their AR uses. Hence, while some surveys suggest that ownership and, to a lesser extent, use of AWs may be fairly common among certain subsets of offenders, the overwhelming weight of evidence from gun recovery and survey studies indicates that AWs are used in a small percentage of gun crimes overall.

3.1.2. Are Assault Weapons More Attractive to Criminal Users Than Other Gun Users?

Although AWs are used in a small percentage of gun crimes, some have argued that AWs are more likely to be used in crime than other guns, i.e., that AWs are more attractive to criminal than lawful gun users due to the weapons' military-style features and their particularly large ammunition magazines. Such arguments are based on data implying that AWs are more common among crime guns than among the general stock of civilian firearms. According to some estimates generated prior to the federal ban, AWs accounted for less than one percent of firearms owned by civilians but up to 11% of guns used in crime, based on firearms reported by police to ATF between 1986 and 1993 (e.g., see Cox Newspapers, 1989; Lennett, 1995). However, these estimates were problematic in a number of respects. As discussed in Chapter 6, ATF statistics are not necessarily representative of the types of guns most commonly recovered by police, and ATF statistics from the late 1980s and early 1990s in particular tended to overstate the prevalence of AWs among crime guns. Further, estimating the percentage of civilian weapons that are AWs is difficult because gun production data are not reported by model, and one must also make assumptions about the rate of attrition among the stock of civilian firearms.

Our own more recent assessment indicates that AWs accounted for about 2.5% of guns produced from 1989 through 1993 (see Chapter 5). Relative to previous estimates, this may signify that AWs accounted for a growing share of civilian firearms in the years just before the ban, though the previous estimates likely did not correspond to the exact list of weapons banned in 1994 and thus may not be entirely comparable to our estimate. At any rate, the 2.5% figure is comparable to most of the AW crime gun estimates listed above; hence, it is not clear that AWs are used disproportionately in most crimes, though AWs still seem to account for a somewhat disproportionate share of guns used in murders and other serious crimes.

Perhaps the best evidence of a criminal preference for AWs comes from a study of young adult handgun buyers in California that found buyers with minor criminal histories (i.e., arrests or misdemeanor convictions that did not disqualify them from purchasing firearms) were more than twice as likely to purchase APs than were buyers with no criminal history (4.6% to 2%, respectively) (Wintemute et al., 1998a). Those with more serious criminal histories were even more likely to purchase APs: 6.6% of those who had been charged with a gun offense bought APs, as did 10% of those who had been charged with two or more serious violent offenses. AP purchasers were also more likely to be arrested subsequent to their purchases than were other gun purchasers.

Among gun buyers with prior charges for violence, for instance, AP buyers were more than twice as likely as other handgun buyers to be charged with any new offense and three times as likely to be charged with a new violent or gun offense. To our knowledge, there have been no comparable studies contrasting AR buyers with other rifle buyers.

3.2. Criminal Use of Large Capacity Magazines

Relative to the AW issue, criminal use of LCMs has received relatively little attention. Yet the overall use of guns with LCMs, which is based on the combined use of AWs and non-banned guns with LCMs, is much greater than the use of AWs alone. Based on data examined for this and a few prior studies, guns with LCMs were used in roughly 14% to 26% of most gun crimes prior to the ban (see Chapter 8; Adler et al., 1995; Koper, 2001; New York Division of Criminal Justice Services, 1994).

- Baltimore (all guns recovered by police, 1993): 14%
- Milwaukee (guns recovered in murder investigations, 1991-1993): 21%
- Anchorage, Alaska (handguns used in serious crimes, 1992-1993): 26%
- New York City (guns recovered in murder investigations, 1993): 16-25%[15]
- Washington, DC (guns recovered from juveniles, 1991-1993): 16%[16]
- National (guns used in murders of police, 1994): 31%-41%[17]

Although based on a small number of studies, this range is generally consistent with national survey estimates indicating approximately 18% of all civilian-owned guns and 21% of civilian-owned handguns were equipped with LCMs as of 1994 (Cook and Ludwig, 1996, p. 17). The exception is that LCMs may have been used disproportionately in murders of police, though such incidents are very rare.

As with AWs and crime guns in general, most crime guns equipped with LCMs are handguns. Two handgun models manufactured with LCMs prior to the ban (the Glock 17 and Ruger P89) were among the 10 crime gun models most frequently recovered by law enforcement and reported to ATF during 1994 (ATF, 1995).

[15] The minimum estimate is based on cases in which discharged firearms were recovered, while the maximum estimate is based on cases in which recovered firearms were positively linked to the case with ballistics evidence (New York Division of Criminal Justice Services, 1994).
[16] Note that Washington, DC prohibits semiautomatic firearms accepting magazines with more than 12 rounds (and handguns in general).
[17] The estimates are based on the sum of cases involving AWs or other guns sold with LCMs (Adler et al., 1995, p.4). The minimum estimate is based on AW-LCM cases as a percentage of all gun murders of police. The maximum estimate is based on AW-LCM cases as a percentage of cases in which the gun model was known.

3.3. Summary

In sum, AWs and LCMs were used in up to a quarter of gun crimes prior to the 1994 AW-LCM ban. By most estimates, AWs were used in less than 6% of gun crimes even before the ban. Some may have perceived their use to be more widespread, however, due to the use of AWs in particularly rare and highly publicized crimes such as mass shootings (and, to a lesser extent, murders of police), survey reports suggesting high levels of AW ownership among some groups of offenders, and evidence that some AWs are more attractive to criminal than lawful gun buyers.

In contrast, guns equipped with LCMs – of which AWs are a subset – are used in roughly 14% to 26% of gun crimes. Accordingly, the LCM ban has greater potential for affecting gun crime. However, it is not clear how often the ability to fire more than 10 shots without reloading (the current magazine capacity limit) affects the outcomes of gun attacks (see Chapter 9). All of this suggests that the ban's impact on gun violence is likely to be small.

4. OVERVIEW OF STUDY DESIGN, HYPOTHESES, AND PRIOR FINDINGS

Section 110104 of the AW-LCM ban directed the Attorney General of the United States to study the ban's impact and report the results to Congress within 30 months of the ban's enactment, a provision which was presumably motivated by a sunset provision in the legislation (section 110105) that will lift the ban in September 2004 unless Congress renews the ban. In accordance with the study requirement, the National Institute of Justice (NIJ) awarded a grant to the Urban Institute to study the ban's short-term (i.e., 1994-1996) effects. The results of that study are available in a number of reports, briefs, and articles written by members of this research team (Koper and Roth, 2001a; 2001b; 2002a; Roth and Koper, 1997; 1999).[18] In order to understand the ban's longer-term effects, NIJ provided additional funding to extend the AW research. In 2002, we delivered an interim report to NIJ based on data extending through at least the late 1990s (Koper and Roth, 2002b). This report is based largely on the 2002 interim report, but with various new and updated analyses extending as far as 2003. It is thus a compilation of analyses conducted between 1998 and 2003. The study periods vary somewhat across the analyses, depending on data availability and the time at which the data were collected.

4.1. Logical Framework for Research on the Ban

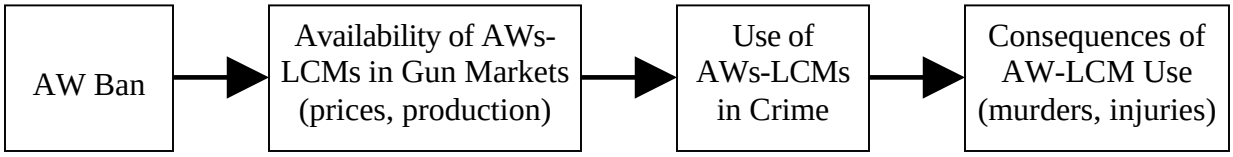
An important rationale for the AW-LCM ban is that AWs and other guns equipped with LCMs are particularly dangerous weapons because they facilitate the rapid firing of high numbers of shots, thereby potentially increasing injuries and deaths from gun violence. Although AWs and LCMs were used in only a modest share of gun crimes before the ban, it is conceivable that a decrease in their use might reduce fatal and non-fatal gunshot victimizations, even if it does not reduce the overall rate of gun crime. (In Chapter 9, we consider in more detail whether forcing offenders to substitute other guns and smaller magazines can reduce gun deaths and injuries.)

It is not clear how quickly such effects might occur, however, because the ban exempted the millions of AWs and LCMs that were manufactured prior to the ban's effective date in September 1994. This was particularly a concern for our first study, which was based on data extending through mid-1996, a period potentially too short to observe any meaningful effects. Consequently, investigation of the ban's effects on gun markets – and, most importantly, how they have affected criminal use of AWs and LCMs – has played a central role in this research. The general logic of our studies, illustrated in Figure 4-1, has been to first assess the law's impact on the availability of AWs and LCMs, examining price and production (or importation) indices in legal markets and relating them to trends in criminal use of AWs and LCMs. In turn, we can relate these market patterns to trends in the types of gun crimes most likely to be affected by changes in the use of AWs and LCMs. However, we cannot make definitive assessments of the

[18] The report to Congress was the Roth and Koper (1997) report.

ban's impact on gun violence until it is clear that the ban has indeed reduced criminal use of AWs and LCMs.

Figure 4-1. Logic Model for Research on the Assault Weapons Ban



4.2. Hypothesized Market Effects

4.2.1. A General Description of Gun Markets

Firearms are distributed in markets commonly referred to as primary and secondary markets. Illicit gun transactions occur in both markets. Primary markets include wholesale and retail transactions by federally-licensed gun dealers, referred to as federal firearm licensees. Licensed dealers are required to, among things, follow federal and state background procedures to verify the eligibility of purchasers, observe any legally required waiting period prior to making transfers, and maintain records of gun acquisitions and dispositions (though records are not required for sales of ammunition magazines).

Despite these restrictions, survey data suggest that as many as 21% of adult gun offenders obtained guns from licensed dealers in the years prior to the ban (Harlow, 2001, p. 6; also see Wright and Rossi, 1986, pp. 183,185). In more recent years, this figure has declined to 14% (Harlow, 2001, p. 6), due likely to the Brady Act, which established a national background check system for purchases from licensed dealers, and reforms of the federal firearms licensing system that have greatly reduced the number of licensed gun dealers (see ATF, 2000; Koper, 2002). Some would-be gun offenders may be legally eligible buyers at the time of their acquisitions, while others may seek out corrupt dealers or use other fraudulent or criminal means to acquire guns from retail dealers (such as recruiting a legally entitled buyer to act as a "straw purchaser" who buys a gun on behalf of a prohibited buyer).

Secondary markets encompass second-hand gun transactions made by non-licensed individuals.[19] Secondary market participants are prohibited from knowingly transferring guns to ineligible purchasers (e.g., convicted felons and drug abusers). However, secondary transfers are not subject to the federal record-keeping and background check requirements placed on licensed dealers, thus making the secondary

[19] Persons who make only occasional sales of firearms are not required to obtain a federal firearms license (ATF, 2000, p. 11).

market almost entirely unregulated and, accordingly, a better source of guns for criminal users.[20] In the secondary market, ineligible buyers may obtain guns from a wide variety of legitimate or illegitimate gun owners: relatives, friends, fences, drug dealers, drug addicts, persons selling at gun shows, or other strangers (e.g., see Wright and Rossi, 1986; Sheley and Wright, 1993a). Of course, ineligible purchasers may also steal guns from licensed gun dealers and private gun owners.

Secondary market prices are generally lower than primary market prices (because the products are used), though the former may vary substantially across a range of gun models, places, circumstances, and actors. For example, street prices of AWs and other guns can be 3 to 6 times higher than legal retail prices in jurisdictions with strict gun controls and lower levels of gun ownership (Cook et al., 1995, p. 72). Nonetheless, experts note that primary and secondary market prices correspond to one another, in that relatively expensive guns in the primary market are also relatively expensive in the secondary market. Moreover, in any given locality, trends in secondary market prices can be expected to track those in the primary market because a rise in primary market prices for new weapons will increase demand for used weapons and therefore increase secondary market prices (Cook et al., 1995, p. 71).

4.2.2. The AW-LCM Ban and Gun Markets

In the long term, we can expect prices of the banned guns and magazines to gradually rise as supplies dwindle. As prices rise, more would-be criminal users of AWs and LCMs will be unable or unwilling to pay the higher prices. Others will be discouraged by the increasing non-monetary costs (i.e., search time) of obtaining the weapons. In addition, rising legal market prices will undermine the incentive for some persons to sell AWs and LCMs to prohibited buyers for higher premiums, thereby bidding some of the weapons away from the channels through which they would otherwise reach criminal users. Finally, some would-be AW and LCM users may become less willing to risk confiscation of their AWs and LCMs as the value of the weapons increases. Therefore, we expect that over time diminishing stocks and rising prices will lead to a reduction in criminal use of AWs and LCMs.[21]

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[20] Some states require that secondary market participants notify authorities about their transactions. Even in these states, however, it is not clear how well these laws are enforced.

[21] We would expect these reductions to be apparent shortly after the price increases (an expectation that, as discussed below, was confirmed in our earlier study) because a sizeable share of guns used in crime are used within one to three years of purchase. Based on analyses of guns recovered by police in 17 cities, ATF (1997, p. 8) estimates that guns less than 3 years old (as measured by the date of first retail sale) comprise between 22% and 43% of guns seized from persons under age 18, between 30% and 54% of guns seized from persons ages 18 to 24, and between 25% and 46% of guns seized from persons over 24. In addition, guns that are one year old or less comprise the largest share of relatively new crime guns (i.e., crime guns less than three years old) (Pierce et al., 1998, p. 11). Similar data are not available for secondary market transactions, but such data would shorten the estimated time from acquisition to criminal use.

However, the expected timing of the market processes is uncertain. We can anticipate that AW and LCM prices will remain relatively stable for as long as the supply of grandfathered weapons is adequate to meet demand. If, in anticipation of the ban, gun manufacturers overestimated the demand for AWs and LCMs and produced too many of them, prices might even fall before eventually rising. Market responses can be complicated further by the continuing production of legal AW substitute models by some gun manufacturers. If potential AW buyers are content with an adequate supply of legal AW-type weapons having fewer military features, it will take longer for the grandfathered AW supply to constrict and for prices to rise. Similarly, predicting LCM price trends is complicated by the overhang of military surplus magazines that can fit civilian weapons (e.g., military M-16 rifle magazines that can be used with AR-15 type rifles) and by the market in reconditioned magazines. The "aftermarket" in gun accessories and magazine extenders that can be used to convert legal guns and magazines into banned ones introduces further complexity to the issue.

4.3. Prior Research on the Ban's Effects

To summarize the findings of our prior study, Congressional debate over the ban triggered pre-ban speculative price increases of upwards of 50% for AWs during 1994, as gun distributors, dealers, and collectors anticipated that the weapons would become valuable collectors' items. Analysis of national and local data on guns recovered by police showed reductions in criminal use of AWs during 1995 and 1996, suggesting that rising prices made the weapons less accessible to criminal users in the short-term aftermath of the ban.

However, the speculative increase in AW prices also prompted a pre-ban boost in AW production; in 1994, AW manufacturers produced more than twice their average volume for the 1989-1993 period. The oversupply of grandfathered AWs, the availability of the AW-type legal substitute models mentioned earlier, and the steady supply of other non-banned semiautomatics appeared to have saturated the legal market, causing advertised prices of AWs to fall to nearly pre-speculation levels by late 1995 or early 1996. This combination of excess supply and reduced prices implied that criminal use of AWs might rise again for some period around 1996, as the large stock of AWs would begin flowing from dealers' and speculators' gun cases to the secondary markets where ineligible purchasers may obtain guns more easily.

We were not able to gather much specific data about market trends for LCMs. However, available data did reveal speculative, pre-ban price increases for LCMs that were comparable to those for AWs (prices for some LCMs continued to climb into 1996), leading us to speculate – incorrectly, as this study will show (see Chapter 8) – that there was some reduction in LCM use after the ban.[22]

[22] To our knowledge, there have been two other studies of changes in AW and LCM use during the post-ban period. One study reported a drop in police recoveries of AWs in Baltimore during the first half of 1995 (Weil and Knox, 1995), while the other found no decline in recoveries of AWs or LCMs in Milwaukee homicide cases as of 1996 (Hargarten et al., 2000). Updated analyses for both of these cities

Determining whether the reduction in AW use (and perhaps LCM use) following the ban had an impact on gun violence was more difficult. The gun murder rate dropped more in 1995 (the first year following the ban) than would have been expected based on preexisting trends, but the short post-ban follow-up period available for the analysis precluded a definitive assessment as to whether the reduction was statistically meaningful (see especially Koper and Roth, 2001a). The reduction was also larger than would be expected from the AW-LCM ban, suggesting that other factors were at work in accelerating the decline. Using a number of national and local data sources, we also examined trends in measures of victims per gun murder incident and wounds per gunshot victim, based on the hypothesis that these measures might be more sensitive to variations in the use of AWs and LCMs. These analyses revealed no ban effects, thus failing to show confirming evidence of the mechanism through which the ban was hypothesized to affect the gun murder rate. However, newly available data presented in subsequent chapters suggest these assessments may have been premature, because any benefits from the decline in AW use were likely offset by steady or rising use of other guns equipped with LCMs, a trend that was not apparent at the time of our earlier study.

We cautioned that the short-term patterns observed in the first study might not provide a reliable guide to longer-term trends and that additional follow-up was warranted. Two key issues to be addressed were whether there had been a rebound in AW use since the 1995-1996 period and, if so, whether that rebound had yet given way to a long-term reduction in AW use. Another key issue was to seek more definitive evidence on short and long-term trends in the availability and criminal use of LCMs. These issues are critical to assessing the effectiveness of the AW-LCM ban, but they also have broader implications for other important policy concerns, namely, the establishment of reasonable timeframes for sunset and evaluation provisions in legislation. In other words, how long is long enough in evaluating policy and setting policy expiration dates?

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are presented in Chapters 6 and 8.

5. MARKET INDICATORS FOR ASSAULT WEAPONS: PRICES AND PRODUCTION

This chapter assesses the ban's impact on the availability of AWs in primary and secondary markets, as measured by trends in AW prices and post-ban production of legal AW substitute models. Understanding these trends is important because they influence the flow of grandfathered weapons to criminals and the availability of non-banned weapons that are close substitutes for banned ones. In the next chapter, we assess the impact of these trends on criminal use of AWs, as approximated by statistics on gun seizures by police. (Subsequent chapters present similar analyses for LCMs.)

Following our previous methods, we compare trends for AWs to trends for various non-banned firearms. The AW analyses generally focus on the most common AWs formerly produced in the U.S., including Intratec and SWD-type APs and AR-15-type ARs produced by Colt and others. In addition, we selected a small number of domestic pistol and rifle models made by Calico and Feather Industries that fail the features test provision of the AW legislation and that were relatively common among crime guns reported by law enforcement agencies to ATF prior to the ban (see Roth and Koper, 1997, Chapter 5). Together, this group of weapons represented over 80% of AWs used in crime and reported to ATF from 1993 through 1996, and the availability of these guns was not affected by legislation or regulations predating the AW-LCM ban.[23] We also examine substitution of legalized, post-ban versions of these weapons, including the Intratec AB-10 and Sport-22, FMJ's PM models (substitutes for the SWD group), Colt Sporters, Calico Liberty models, and others. We generally did not conduct comparative analyses of named foreign AWs (the Uzi, Galil, and AK weapons) because the 1989 federal import ban had already limited their availability, and their legal status was essentially unchanged by the 1994 ban.

The exact gun models and time periods covered vary across the analyses (based on data availability and the time at which data were collected). The details of each analysis are described in the following sections.

5.1. Price Trends for Assault Weapons and Other Firearms

To approximate trends in the prices at which AWs could be purchased throughout the 1990s, we collected annual price data for several APs, ARs, and non-banned comparison firearms from the *Blue Book of Gun Values* (Fjestad, 1990-1999). The *Blue Book* provides national average prices for an extensive list of new and used firearms based on information collected at gun shows and input provided by networks of dealers

[23] The Intratec group includes weapons made by AA Arms. The SWD group contains related models made by Military Armaments Corporation/Ingram and RPB Industries. The AR-15 group contains models made by Colt and copies made by Bushmaster, Olympic Arms, Eagle Arms, SGW Enterprises, Essential Arms, DPMS, and Sendra.

and collectors. The *Blue Book* is utilized widely in the gun industry, though prices in any given locality may differ notably from the averages appearing in the *Blue Book*.

To assess time trends in gun prices, we conducted hedonic price analyses (Berndt, 1990) in which the gun prices were regressed upon a series of year and model indicators. The coefficients for the year indicators show annual changes in the prices of the guns relative to 1994 (the year the ban went into effect), controlling for time-stable differences in the prices of various gun models. Since manufacturers' suggested retail prices (MSRP) were not available for banned AWs during post-ban years, we utilized prices for AWs in 100% condition for all years.[24] For non-banned firearms, we used MSRP.[25] For all models, we divided the gun prices by annual values of the gross domestic product price deflator provided in the December 2001 and 2000 issues of *Economic Indicators* and logged these adjusted prices.

Each model presented below is based on data pooled across a number of firearm models and years, so that observation P_{jt} represents the price of gun model j during year t. We weighted each observation, P_{jt}, based on cumulative estimates of the production of model j from 1985 or 1986 (depending on data availability) through year t using data provided by gun manufacturers to ATF and published by the Violence Policy Center (1999).[26, 27]

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[24] Project staff also collected prices of weapons in 80% condition. However, the levels and annual changes of the 80% prices were very highly correlated (0.86 to 0.99) with those of the 100% condition prices. Therefore, we limited the analysis to the 100% prices.

[25] We utilized prices for the base model of each AW and comparison firearm (in contrast to model variations with special features or accessories).

[26] The regression models are based on equal numbers of observations for each gun model. Hence, unweighted regressions would give equal weight to each gun model. This does not seem appropriate, however, because some guns are produced in much larger numbers than are other guns. Weighting the regression models by production estimates should therefore give us a better sense of what one could "typically" expect to pay for a generic gun in each study category (e.g., a generic assault pistol).

[27] Several of the selected weapons began production in 1985 or later. In other cases, available production data extended back to only the mid-1980s. Published production figures for handguns are broken down by type (semiautomatic, revolver) and caliber and thus provide perfect or very good approximations of production for the handgun models examined in this study. Rifle production data, however, are not disaggregated by gun type, caliber, or model. For the ARs under study, the production counts should be reasonable approximations of AR production because most of the rifles made by the companies in question prior to the ban were ARs. The rifles used in the comparison (i.e., non-banned) rifle analysis are made by companies (Sturm Ruger, Remington, and Marlin) that produce numerous semiautomatic and non-semiautomatic rifle models. However, the overall rifle production counts for these companies should provide some indication of differences in the availability of the comparison rifles relative to one another. Because production data were available through only 1997 at the time this particular analysis was conducted (Violence Policy Center, 1999), we used cumulative production through 1997 to weight the 1998 and 1999 observations for the comparison handgun and comparison rifle models. This was not a consideration for AWs since their production ceased in 1994 (note that the AW production figures for 1994 may include some post-ban legal substitute models manufactured after September 13, 1994). Nonetheless, weighting had very little effect on the inferences from either of the comparison gun models.

5.1.1. Assault Pistol Prices

The analysis of AP prices focuses on the Intratec TEC-9/DC-9, TEC-22, SWD M-11/9, and Calico M950 models. Regression results are shown in Table 5-1, while Figure 5-1 graphically depicts the annual trend in prices for the period 1990 through 1999. None of the yearly coefficients in Table 5-1 is statistically significant, thus indicating that average annual AP prices did not change during the 1990s after adjusting for inflation. Although the model is based on a modest number of observations (n=40) that may limit its statistical power (i.e., its ability to detect real effects), the size of the yearly coefficients confirm that prices changed very little from year to year. The largest yearly coefficient is for 1990, and it indicates that AP prices were only 4% higher in 1990 than in 1994.[28]

This stands in contrast to our earlier finding (Roth and Koper, 1997, Chapter 4) that prices for SWD APs may have risen by as much as 47% around the time of the ban. However, the earlier analyses were based on semi-annual or quarterly analyses advertised by gun distributors and were intended to capture short-term fluctuations in price that assumed greater importance in the context of the first AW study, which could examine only short-term ban outcomes. *Blue Book* editions released close in time to the ban (e.g., 1995) also cautioned that prices for some AWs were volatile at that time. This study emphasizes longer-term price trends, which appear to have been more stable.[29]

[28] To interpret the coefficient of each indicator variable in terms of a percentage change in the dependent variable, we exponentiate the coefficient, subtract 1 from the exponentiated value, and multiply the difference by 100.

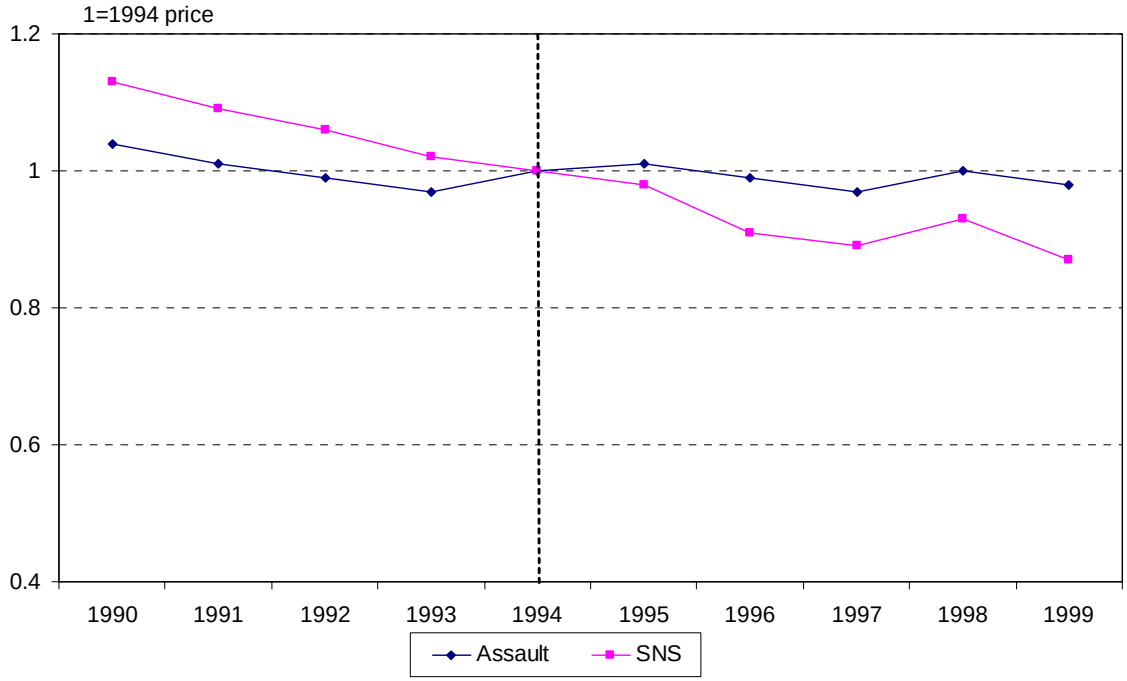
[29] Although the earlier analysis of AP prices focused on the greatest variations observed in semi-annual prices, the results also provide indications that longer-term trends were more stable. Prices in 1993, for example, averaged roughly 73% of the peak prices reached at the time the ban was implemented (i.e., late 1994), while prices in early 1994 and late 1995 averaged about 83% and 79% of the peak prices, respectively. Hence, price variation was much more modest after removing the peak periods around the time of the ban‘s implementation (i.e., late 1994 and early 1995). The wider range of APs used in the current study may also be responsible for some of the differences between the results of this analysis and the prior study.

Table 5-1. Regression of Assault Pistol and Comparison Handgun Prices on Annual Time Indicators, 1990-1999, Controlling for Gun Model

	Assault Pistols (n=40)		Comparison Handguns (n=38)	
	Estimate	**T Value**	**Estimate**	**T Value**
Constant	1.56	26.94***	-0.21	-6.81***
1990	0.04	1.07	0.12	2.07**
1991	0.01	0.30	0.09	1.79*
1992	-0.01	-0.32	0.05	1.30
1993	-0.03	-1.09	0.02	0.48
1995	0.01	0.22	-0.02	-0.48
1996	-0.01	-0.45	-0.09	-2.69***
1997	-0.03	-1.13	-0.11	-3.26***
1998	0.00	-0.10	-0.07	-1.99*
1999	-0.02	-0.58	-0.14	-4.02***
Tec-9	-0.67	-11.95***		
Tec-22	-0.89	-15.59***		
SWD	-0.64	-11.49***		
Davis P32			0.09	3.63***
Davis P380			0.20	8.20***
Lorcin L380			0.29	11.35***
F value	27.79		16.24	
(p value)	<.01		<.01	
Adj. R-square	0.89		0.83	

Time indicators are interpreted relative to 1994. Assault pistol model indicators are interpreted relative to Calico 9mm. Comparison handgun models are interpreted relative to Lorcin .25 caliber.
* Statistically significant at p<=.10.
** Statistically significant at p<=.05.
*** Statistically significant at p<=.01.

Figure 5-1. Annual Price Trends for Assault Pistols and SNS Handguns, 1990-1999



Assault pistol prices basd on TEC9, TEC22, SWD M11/9, and Calico M950. SNS prices based on Davis P32 and P380 and Lorcin L25 and L380.

5.1.2. Comparison Handgun Prices

For comparison, Table 5-1 and Figure 5-1 illustrate price trends for a number of non-banned, cheaply priced, and readily concealable semiautomatic handgun models: the Davis P32 and P380 and the Lorcin L25 and L380. Such guns are often referred to as Saturday night specials (SNS). By a number of accounts, SNS-type guns, and Davis and Lorcin models in particular, are among the guns most frequently used in crime (ATF, 1995; 1997; Kennedy et al., 1996; Wintemute, 1994). Although the differences between APs and SNS handguns (particularly the fact that most SNS handguns do not have LCMs) suggest they are likely to be used by gun consumers with different levels of firearms experience and sophistication, the SNS guns are arguably a good comparison group for APs because both groups of guns are particularly sensitive to criminal demand. Like AP buyers, SNS buyers are more likely than other gun buyers to have criminal histories and to be charged with new offenses, particularly violent or firearm offenses, subsequent to their purchases (Wintemute et al., 1998b).

Prices of SNS handguns dropped notably throughout the 1990s. Prices for SNS handguns were 13% higher in 1990 than in 1994. Prices then dropped another 13% from 1994 to 1999. This suggests that although AP prices remained generally stable throughout the 1990s, they increased relative to prices of other guns commonly used in crime. We say more about this below.

5.1.3. Assault Rifle Prices

To assess trends in prices of ARs, we examined prices for several Colt and Olympic rifle models in the AR-15 class, as well as Calico models M900 and M951 and Feather models AT9 and AT22.[30] Because rifle production data are not disaggregated by weapon type (semiautomatic, bolt action, etc.), caliber, or model, the regressions could only be weighted using overall rifle production counts for each company. For this reason, we calculated the average price of the ARs made by each company for each year and modeled the trends in these average prices over time, weighting by each company's total rifle production.[31]

Results shown in Table 5-2 and Figure 5-2 demonstrate that AR prices rose significantly during 1994 and 1995 before falling back to pre-ban levels in 1996 and remaining there through 1999. Prices rose 16% from 1993 to 1994 and then increased another 13% in 1995 (representing an increase of nearly one third over the 1993 level). Yet by 1996, prices had fallen to levels virtually identical to those before 1994. These patterns are consistent with those we found earlier for the 1992-1996 period (Roth and Koper, 1997, Chapter 4), though the annual price fluctuations shown here were not as dramatic as the quarterly changes shown in the earlier study.

Note, however, that these patterns were not uniform across all of the AR categories. The results of the model were driven largely by the patterns for Colt rifles, which are much more numerous than the other brands. Olympic rifles increased in price throughout the time period, while prices for most Calico and Feather rifles tended to fall throughout the 1990s without necessarily exhibiting spikes around the time of the ban.

[30] Specifically, we tracked prices for the Match Target Lightweight (R6530), Target Government Model (R6551), Competition H-Bar (R6700), and Match Target H-Bar (R6601) models by Colt and the Ultramatch, Service Match, Multimatch M1-1, AR15, and CAR15 models by Olympic Arms. Each of these models has a modified, post-ban version. We utilized prices for the pre-ban configurations during post-ban years.

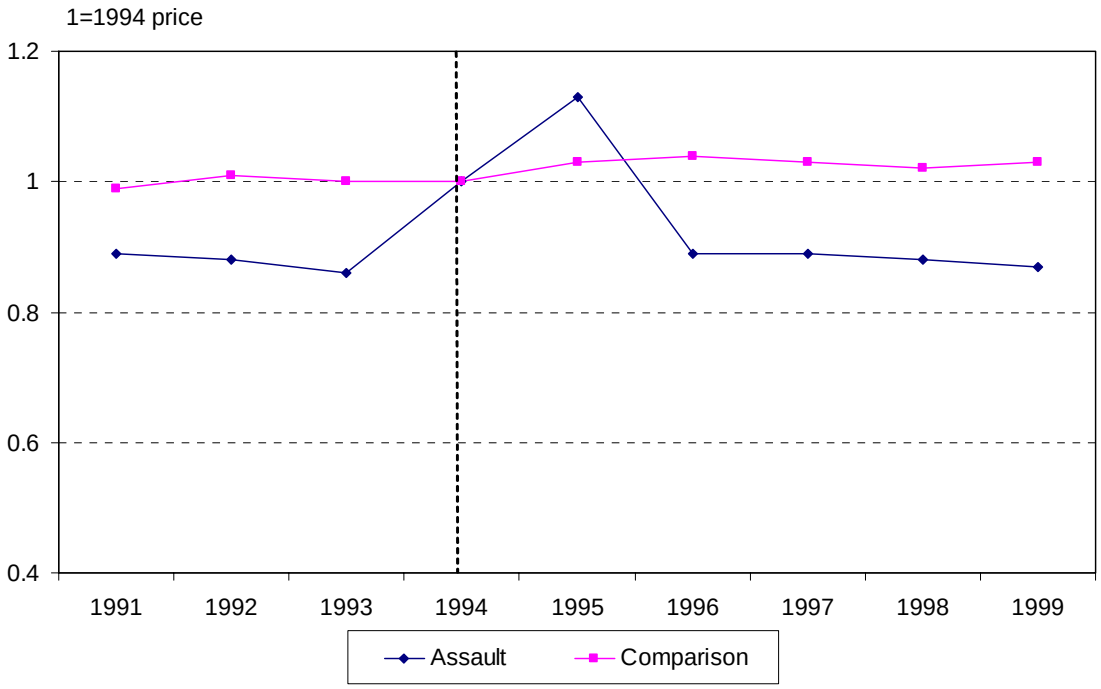
[31] Prices for the different models made by a given manufacturer tended to follow comparable trends, thus strengthening the argument for averaging prices.

Table 5-2. Regression of Assault Rifle and Comparison Semiautomatic Rifle Prices on Annual Time Indicators, 1991-1999, Controlling for Gun Make

	Assault Rifles (n=36)		Comparison Rifles (n=27)	
	Estimate	**T value**	**Estimate**	**T value**
Constant	1.31	21.15***	1.40	76.75***
1991	-0.12	-1.98*	-0.01	-0.21
1992	-0.13	-2.26**	0.01	0.30
1993	-0.15	-2.78**	0	-0.13
1995	0.12	2.47**	0.03	1.08
1996	-0.11	-2.27**	0.04	1.69
1997	-0.11	-2.23**	0.03	1.46
1998	-0.12	-2.47**	0.02	0.91
1999	-0.14	-2.71**	0.03	1.21
Colt (AR-15 type)	1.07	19.93***		
Olympic (AR-15 type)	1.14	16.08***		
Calico	0.43	5.53***		
Ruger			0.26	20.07***
Remington			0.29	21.69***
F statistic	50.52			63.62
(p value)	<.01			<.01
Adj. R-square	0.94			0.96

Time indicators interpreted relative to 1994. Assault rifle makes interpreted relative to Feather.
Comparison rifle makes interpreted relative to Marlin.
* Statistically significant at p<=.10.
** Statistically significant at p<=.05.
*** Statistically significant at p<=.01.

Figure 5-2. Annual Price Trends for Assault Rifles and Comparison Semiautomatic Rifles, 1991-1999



Assault rifle prices based on Colt and Olympic AR-type, Calico, and Feather models. Comparison rifle prices based on selected Remington, Marlin, and Sturm Ruger models.

5.1.4. Comparison Semiautomatic Rifles.

The analysis of comparison rifle prices includes the Remington 7400, Marlin Model 9, and Sturm Ruger Mini-14 and Mini-30 models (the Ruger model prices were averaged for each year). The AW legislation exempted each of these semiautomatic rifles by name, though the exemption does not apply to Mini-14 models with folding stocks (a feature included in the ban's features test). The Ruger models are of particular interest since they are among only four exempted guns that can accept LCMs made for military rifles (U.S. Department of the Treasury, 1998, p. 23), though Ruger produced LCMs only for the Mini-14 model and substituted a 5-round magazine for this gun in 1989 (Fjestad, 2002, pp. 1361-1362). The Marlin model was also manufactured with an LCM prior to 1990 (Fjestad, 2002, p. 917). The Remington model is manufactured with a detachable 4-round magazine.

Prices for these guns remained steady throughout the decade (see Table 5-2 and Figure 5-2). The largest change was a 4% increase (non-significant) in prices in 1996 relative to prices in 1994. Therefore, the rifle price spikes in 1994 and 1995 were specific to assault rifles. However, the steady annual price trends may mask short-term fluctuations that we found

previously (Roth and Koper, 1997, Chapter 4) for some non-banned semiautomatic rifles (including the Ruger Mini-14) during 1994 and early 1995.[32]

5.2. Production Trends for Assault Weapons and Other Firearms

To more fully assess the ban's effects on gun markets, examination of pre and post-ban trends in production of AWs and legal AW substitutes is a useful complement to studying price trends. Our earlier work revealed a spike in AW production during 1994 as the ban was being debated. Post-ban production of legal AW substitutes should reveal additional information about the reaction of gun markets to the ban. If production of these models has fallen off dramatically, it may suggest that the market for AWs has been temporarily saturated and/or that consumers of AWs favor the original AW models that have more military-style features. Stable or rising production levels, on the other hand, may indicate substantial consumer demand for AW substitutes, which would suggest that consumers consider the legal substitute models to be as desirable as the banned models.

5.2.1. Production of Assault Pistols and Other Handguns

Figure 5-3 presents production trends for a number of domestic AP manufacturers from 1985 through 2001 (the most recent year available for data on individual manufacturers).[33] After rising in the early 1990s and surging notably to a peak in 1994, production by these companies dropped off dramatically, falling 80% from 1993-1994 to 1996-1997 and falling another 35% by 1999-2000 (Table 5-3).[34] Makers of Intratec and SWD-type APs continued manufacturing modified versions of their APs for at least a few years following the ban, but at much lower volumes than that at which they produced APs just prior to the ban. Companies like AA Arms and Calico produced very few or no AP-type pistols from 1995 onward, and Intratec – producers of the APs most frequently used in crime – went out of business after 1999.

However, the pattern of rising and then falling production was not entirely unique to APs. Table 5-3 shows that production of all handguns and production of SNS-type pistols both declined sharply in the mid to late 1990s following a peak in 1993. Nonetheless, the trends –

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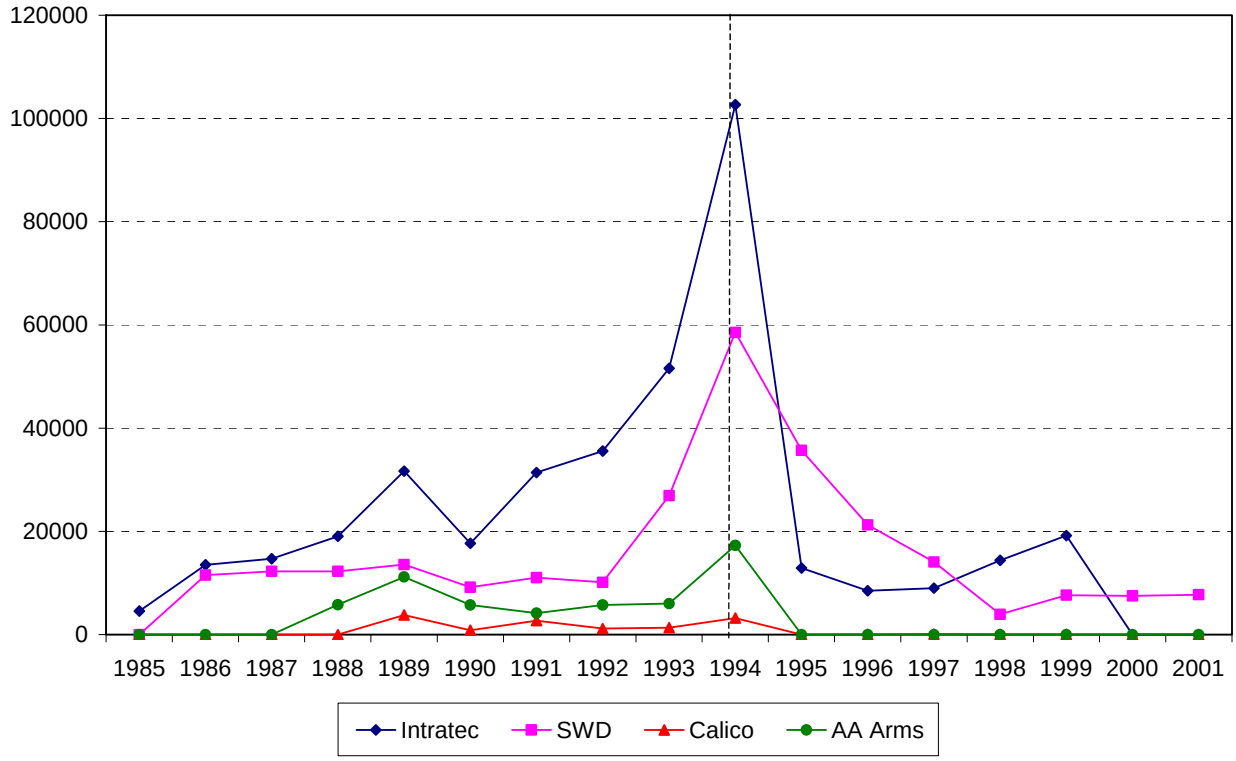
[32] We attributed those short-term fluctuations to pre-ban uncertainty regarding which semiautomatic rifles would be prohibited by the ban. Also note that the prior findings were based on a different set of comparison semiautomatic rifles that included a number of foreign rifles. We concentrated on domestically produced rifles for this updated analysis in order to make more explicit links between rifle price and production trends (data for the latter are available only for domestic firearms).

[33] Production figures for individual manufacturers through 2000 have been compiled by the Violence Policy Center (2002). Year 2001 data are available from ATF via the Internet (see www.atf.treas.gov). National gun production totals through 1998 are also available from ATF (2000, p. A-3).

[34] The assault pistol production figures used here and in the price analysis include 9mm and .22 caliber pistols made by Intratec, 9mm pistols manufactured by AA Arms, all non-.22 caliber pistols manufactured by S.W. Daniels, Wayne Daniels, and Military Armaments Corporation (which together constitute the SWD group), and .22 and 9mm pistols manufactured by Calico. Intratec produces a few non-AW models in .22 and 9mm calibers, so the Intratec figures will overstate production of assault pistols and their legal substitutes to some degree. The comparison, SNS production figures are based on all handguns produced by Lorcin Engineering and Davis Industries.

both peak and decline – were more dramatic for APs than for other handguns. Production of APs rose 69% from 1990-1991 to 1993-1994, while SNS production and overall handgun production each increased 47%. From 1993-1994 to 1996-1997, production of AP-type handguns, SNS models, and all handguns declined 80%, 66%, and 47%, respectively. Further, production of AP-type handguns continued to decline at a faster rate than that of other handguns through the end of the decade.[35]

Figure 5-3. Assault Pistol Production, 1985-2001



[35] Lorcin, a prominent SNS brand that we examined for the price and production analyses, went out of business after 1998. Unlike the situation in the AP market (where, to our knowledge, former AP makers have not been replaced on any large scale), the SNS market appears to have compensated somewhat to offset the loss of Lorcin. The SNS change from 1996-1997 to 1999-2000 is based on examination of a larger group of SNS-type makers, including Lorcin, Davis, Bryco, Phoenix Arms, and Hi-Point. Production among this group declined by 22% from 1996-1997 to 1999-2000, a decline greater than that for total handgun production but less than that for AP-type production.

Table 5-3. Production Trends for Assault Weapons and Other Firearms, 1990-2000*

Firearm Category	% Change 1990/91 to 1993/94	% Change 1993/94 to 1996/97	% Change 1996/97 to 1999/2000
Total Handguns	47%	-47%	-10%
Assault Pistols (or Post-Ban Models)	69%	-80%	-35%
SNS Handguns	47%	-66%	-22%
Total Rifles	22%	8%	18%
Assault Rifles (or Post-Ban Models)	81%	-51%	156%
Comparison Rifles	15%	13%	-16%

* Total handgun and rifle figures include all production by U.S. manufacturers. Assault pistols include Intratec group, SWD group, and Calico models. SNS figures are based on Lorcin Engineering and Davis Industries for changes up through 1996-1997. Because Lorcin went out of business after 1998, the SNS change from 1996-1997 to 1999-2000 is based on a larger group of SNS makers including Lorcin, Davis, Bryco, Phoenix Arms, and Hi-Point. Assault rifles include AR-15 type models by Colt and others. Comparison rifles include Sturm Ruger, Remington, and Marlin.

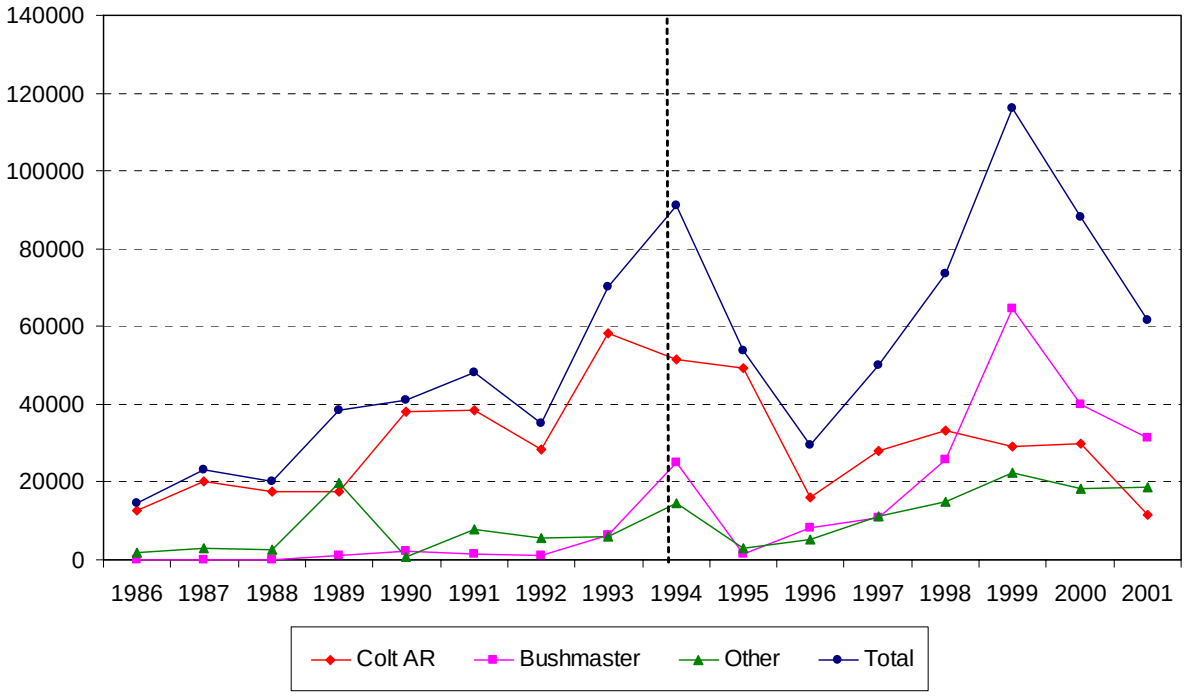
5.2.2. Production of Assault Rifles and Other Rifles

As shown in Figure 5-4, production of AR-15 type rifles surged during the early 1990s, reaching a peak in 1994.[36] AR production during the early 1990s rose almost 4 times faster than total rifle production and over 5 times faster than production of the comparison rifles examined in the price analysis (Table 5-3). Yet, by 1996 and 1997, production of legalized AR-type rifles had fallen by 51%, as production of other rifles continued increasing. AR production trends reversed again during the late 1990s, however, rising over 150%.[37] Total rifle production increased much more modestly during this time (18%), while production of the comparison rifles declined.

[36] Note again that the AR and legalized AR production figures are approximations based on all rifles produced by the companies in question (rifle production data are not available by type, caliber, or model), but it appears that most rifles made by these companies during the study period were AR-type rifles. Also, the figures for the comparison rifle companies (Ruger, Marlin, and Remington) are based on all rifles produced by these companies (the price analysis focused on selected semiautomatic models).

[37] There was also a notable shift in market shares among AR makers, as Bushmaster overtook Colt as the leading producer of AR-15 type rifles (Figure 5-4).

Figure 5-4. Assault Rifle Production, 1986-2001 (AR-15 Type)



Other: Olympic, Eagle/Armalite, DPMS, Essential Arms, Sendra.

5.3. Summary and Interpretations

Below, we offer some interpretations of the patterns found in the price and production analyses, keeping in mind that these analyses were largely descriptive, so causal inferences must be made cautiously. As documented in our earlier study, Congressional debate over the AW-LCM ban triggered speculative price increases for AWs in the months leading up to the ban's enactment. This study's examination of longer-term, annual price trends suggests that this speculative effect was very brief (and perhaps quite variable across jurisdictions) for APs but persisted through 1995 for ARs. This implies that speculators and sophisticated gun collectors (who we suspect played a large role in driving price trends) have more interest in ARs, which tend to be higher in quality and price than APs.

Responding to the speculative price growth, AW manufacturers boosted their production of AWs in 1994. Although total handgun and rifle production were increasing during the early 1990s, the rise in AW production was steeper, and there was a production peak unique to AWs in 1994 (production of other handguns peaked in 1993). It seems that this boost in the supply of grandfathered AWs was sufficient to satisfy speculative demand, thereby restoring national average AP prices to pre-ban levels within a year of the ban and doing the same for AR prices by 1996. AW prices remained stable through the late 1990s, and production of legalized AW-type weapons dropped off

substantially, at least through 1998. This suggests that the supply of grandfathered AWs was sufficient to meet demand through the late 1990s.

However, prices of APs rose relative to other handguns commonly used in crime during the 1990s. Handgun prices and production declined in general during the late 1990s, implying a decrease in demand for APs and other handguns that probably stemmed from the nation's declining crime rates.[38] But the AW ban's restriction of the AP supply, combined with the interest of speculators and collectors in these guns, may have prevented AP prices from falling as did prices for other handguns. The market patterns also suggest that consumers of APs are not as easily satisfied by legalized APs with fewer military-style features; despite the increasing value of APs (in relative terms), post-ban production of legalized APs declined faster than did production of other handguns, and some AP makers went out of business.

Prices of ARs, on the other hand, remained steady during the late 1990s (after the speculative price bubble of 1994-1995) both in absolute terms and relative to other rifles. The failure of AR prices to rise in at least relative terms, as occurred for APs, and the temporary drop in production of AR-type rifles after the ban may signify that the AR market was saturated relative to the AP market for a least a number of years following the ban. However, demand for AR-type rifles later rebounded, as evidenced by the resurgence in production of legalized, AR-type rifles in the late 1990s. In fact, more of these guns were produced in 1999 than in 1994. Unlike AP users, therefore, rifle users appear to be readily substituting the legalized AR-type rifles for the banned ARs, which may be another factor that has kept prices of the latter rifles from rising. All of this suggests that rifle owners, who have a lower prevalence of criminal users than do handgun owners, can more easily substitute rifles with fewer or no military features for the hunting and other sporting purposes that predominate among rifle consumers.

Another relevant factor may have been a surge in the supply of foreign semiautomatic rifles that can accept LCMs for military weapons (the LCMM rifles discussed in Chapter 2) during the early 1990s. Examples of LCMM rifles include legalized versions of banned AK-47, FN-FAL, and Uzi rifles. Importation of LCMM rifles rose from 19,147 in 1991 to 191, 341 in 1993, a nine-fold increase (Department of the Treasury, 1998, p. 34). Due to an embargo on the importation of firearms from China (where many legalized AK-type rifles are produced), imports of LCMM rifles dropped

[38] It seems likely that the rise and fall of handgun production was linked to the rising crime rates of the late 1980s and early 1990s and the falling crime rates of the mid and late 1990s. Self-defense and fear of crime are important motivations for handgun ownership among the general population (e.g., Cook and Ludwig, 1996; McDowall and Loftin, 1983), and the concealability and price of handguns make them the firearms of choice for criminal offenders. It is likely that the peak in 1993 was also linked to the Congressional debate and passage of the Brady Act, which established a background check system for gun purchases from retail dealers. It is widely recognized in the gun industry that the consideration of new gun control legislation tends to increase gun sales.

The decline in production was more pronounced for SNS handguns, whose sales are likely to be particularly sensitive to crime trends. Criminal offenders make disproportionate use of these guns. We can also speculate that they are prominent among guns purchased by low-income citizens desiring guns for protection. In contrast, the poor quality and reliability of these guns make them less popular among more knowledgeable and affluent gun buyers.

back down to 21,261 in 1994. Importation of all foreign LCMM rifles was ended by federal executive order in 1998.

ATF has reported that criminal use of LCMM rifles increased more quickly during the early 1990s than did that of other military-style rifles (U.S. Department of the Treasury, 1998, p. 33; also see Chapter 6). Accordingly, it is possible that the availability of LCMM rifles also helped to depress the prices of domestic ARs and discourage the production of legalized ARs during the 1990s, particularly if criminal users of rifles place a premium on the ability to accept LCMs. It is noteworthy, moreover, that the rebound in domestic production of legalized ARs came on the heels of the 1998 ban on LCMM rifles, perhaps suggesting the LCMM ban increased demand for domestic rifles accepting LCMs.

In sum, this examination of the AW ban's impact on gun prices and production suggests that there has likely been a sustained reduction in criminal use of APs since the ban but not necessarily ARs. Since most AWs used in crime are APs, this should result in an overall decline in AW use. In the following chapter, we examine the accuracy of this prediction.

6. CRIMINAL USE OF ASSAULT WEAPONS AFTER THE BAN

6.1. Measuring Criminal Use of Assault Weapons: A Methodological Note

In this chapter, we examine trends in the use of AWs using a number of national and local data sources on guns recovered by law enforcement agencies (we focus on the domestic AW models discussed at the beginning of the previous chapter). Such data provide the best available indicator of changes over time in the types (and especially the specific makes and models) of guns used in violent crime and possessed and/or carried by criminal and otherwise deviant or high-risk persons. The majority of firearms recovered by police are tied to weapon possession and carrying offenses, while the remainder are linked primarily to violent crimes and narcotics offenses (e.g., see ATF, 1976; 1977; 1997; Brill, 1977). In general, up to a quarter of guns confiscated by police are associated with violent offenses or shots fired incidents (calculated from ATF, 1977, pp. 96-98; 1997; Brill, 1977, pp. 24,71; Shaw, 1994, pp. 63, 65; also see data presented later in this chapter). Other confiscated guns may be found by officers, turned in voluntarily by citizens, or seized by officers for temporary safekeeping in situations that have the potential for violence (e.g., domestic disputes).

Because not all recovered guns are linked to violent crime investigations, we present analyses based on all gun recoveries and gun recoveries linked to violent crimes where appropriate (some of the data sources are based exclusively, or nearly so, on guns linked to violent crimes). However, the fact that a seized gun is not clearly linked to a violent crime does not rule out the possibility that it had been or would have been used in a violent crime. Many offenders carry firearms on a regular basis for protection and to be prepared for criminal opportunities (Sheley and Wright, 1993a; Wright and Rossi, 1986). In addition, many confiscated guns are taken from persons involved in drugs, a group involved disproportionately in violence and illegal gun trafficking (National Institute of Justice, 1995; Sheley and Wright, 1993a). In some instances, criminal users, including those fleeing crime scenes, may have even possessed discarded guns found by patrol officers. For all these reasons, guns recovered by police should serve as a good approximation of the types of guns used in violent crime, even though many are not clearly linked to such crimes.

Two additional caveats should be noted with respect to tracking the use of AWs. First, we can only identify AWs based on banned makes and models. The databases do not contain information about the specific features of firearms, thus precluding any assessment of non-banned gun models that were altered after purchase in ways making them illegal. In this respect, our numbers may understate the use of AWs, but we know of no data source with which to evaluate the commonality of such alterations. Second, one cannot always distinguish pre-ban versions of AWs from post-ban, legalized versions of the same weapons based on weapon make and model information (this occurs when the post-ban version of an AW has the same name as the pre-ban version), a factor which may have caused us to overstate the use of AWs after the ban. This was more of a problem for our assessment of ARs, as will be discussed below.

Finally, we generally emphasize trends in the percentage of crime guns that are AWs in order to control for overall trends in gun violence and gun recoveries. Because gun violence was declining throughout the 1990s, we expected the number of AW recoveries to drop independently of the ban's impact.

6.2. National Analysis of Guns Reported By Police to the Federal Bureau of Alcohol, Tobacco, and Firearms

6.2.1. An Introduction to Gun Tracing Data

In this section, we examine national trends in AW use based on firearm trace requests submitted to ATF by federal, state, and local law enforcement personnel throughout the nation. A gun trace is an investigation that typically tracks a gun from its manufacture to its first point of sale by a licensed dealer. Upon request, ATF traces guns seized by law enforcement as a service to federal, state, and local agencies. In order to initiate a trace on a firearm, the requesting law enforcement agency provides information about the firearm, such as make, model, and serial number.

Although ATF tracing data provide the only available national sample of the types of guns used in crime and otherwise possessed or carried by criminal and high-risk groups, they do have limitations for research purposes. Gun tracing is voluntary, and police in most jurisdictions do not submit trace requests for all, or in some cases any, guns they seize. Crime and tracing data for 1994, for example, suggest that law enforcement agencies requested traces for 27% of gun homicides but only 1% of gun robberies and gun assaults known to police during that year (calculated from ATF, 1995 and Federal Bureau of Investigation, 1995, pp. 13, 18, 26, 29, 31, 32).

The processes by which state and local law enforcement agencies decide to submit guns for tracing are largely unknown, and there are undoubtedly important sources of variation between agencies in different states and localities. For example, agencies may be less likely to submit trace requests in states that maintain their own registers of gun dealers' sales. Knowledge of ATF's tracing capabilities and procedures,[39] as well as participation in federal/state/local law enforcement task forces, are some of the other factors that may affect an agency's tracing practices. Further, these factors are likely to vary over time, a point that is reinforced below.

Therefore, firearms submitted to ATF for tracing may not be representative of the

[39] To illustrate, ATF cannot (or does not) trace military surplus weapons, imported guns without the importer name (generally, pre-1968 guns), stolen guns**,** or guns without a legible serial number (Zawitz 1995). Tracing guns manufactured before 1968 is also difficult because licensed dealers were not required to keep records of their transactions prior to that time. Throughout much of the 1990s, ATF did not generally trace guns older than 5-10 years without special investigative reasons (Kennedy et al., 1996, p. 171). Our data are based on trace requests rather than successful traces, but knowledge of the preceding operational guidelines might have influenced which guns law enforcement agencies chose to trace in some instances.

types of firearms typically seized by police. In general, not much is known about the nature of potential bias in tracing data. In prior studies, however, AWs tended to be more common in tracing data than in more representative samples of guns confiscated by police (Kleck, 1997, pp. 112, 141). This suggests that police have been more likely historically to initiate traces for seized AWs than for other seized guns. Although comparisons across studies are complicated by varying definitions of AWs used in different analyses, studies of guns confiscated by police or used in particular types of crimes generally suggest that AWs accounted for up to 6% of crime guns and about 2% on average prior to the federal AW ban (see Chapter 3 and Kleck, 1997, p. 141), whereas studies of pre-ban tracing data indicated that 8% of traced guns, and sometimes as many as 11%, were AWs (Cox Newspapers, 1989; Lenett, 1995; Zawitz, 1995).

Changes over time in the tracing practices of law enforcement agencies present additional complexities in analyzing tracing data. Due to improvements in the tracing process, ATF promotional efforts, and special initiatives like the Youth Crime Gun Interdiction Initiative (see ATF, 1997; 1999 and more recent reports available via the Internet at www.atf.treas.gov),[40] the utilization of tracing grew substantially throughout the 1990s in jurisdictions that chose to participate (also see ATF, 2000; Roth and Koper, 1997). To illustrate, trace requests to ATF rose from roughly 42,300 in 1991 to 229,500 in 2002 (see Table 6-1 in the next section), an increase of 443%. This growth reflects changes in tracing practices (i.e., changes in the number of agencies submitting trace requests and/or changes in the percentage of recovered guns for which participating agencies requested traces) rather than changes in gun crime; gun homicides, for example, were falling throughout the 1990s (see Table 6-1 in the next section) and were a third lower in 2002 than in 1991.

Therefore, an increase in trace requests for AWs does not necessarily signal a real increase in the use of AWs. Further, examining trends in the percentage of trace requests associated with AWs is also problematic. Because law enforcement agencies were more likely to request traces for AWs than for other guns in years past, we can expect the growth rate in tracing for non-AWs to exceed the growth rate in traces for AWs as gun tracing becomes more comprehensive. Consequently, AWs are likely to decline over time as a share of trace requests due simply to reporting effects, except perhaps during periods when AWs figure prominently in public discourse on crime.[41]

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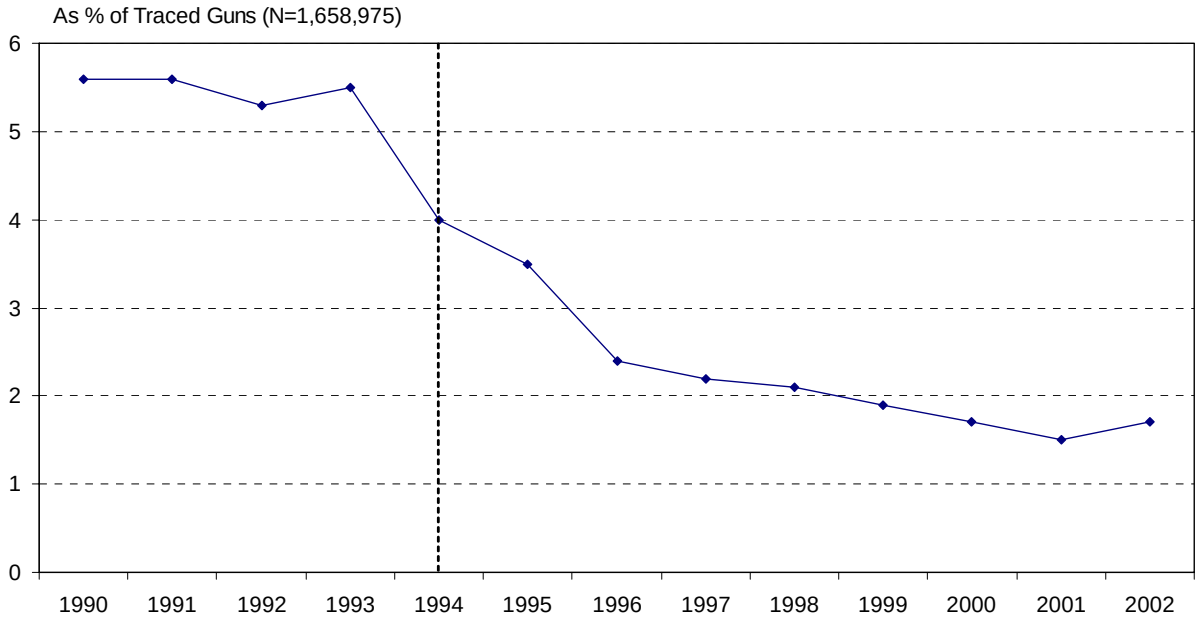
[40] As part of this initiative, police in a few dozen large cities are submitting trace requests to ATF for all guns that they confiscate. The initiative began with 17 cities in 1996 and has since spread to 55 major urban jurisdictions.

[41] To illustrate, assume that a hypothetical police agency recovers 100 guns a year, 2 of which are AWs, and that the agency has a selective tracing policy that results in the submission of trace requests for 20 of the guns, including 1 of the recovered AWs. Under this scenario, the department would be almost three times as likely to request traces for AWs as for other guns. If the department adopted a policy to request traces on all guns (and again recovered 2 AWs and 98 other guns), AW traces would double and traces of other guns would increase by more than 400%. Moreover, AWs would decline from 5% of traced guns to 2% of traced guns due simply to the change in tracing policy.

6.2.2. Traces of Assault Weapons, 1990-2002

Figure 6-1 illustrates the share of all traces that were for AWs from 1990 through 2002. A more detailed assessment of annual changes in traces for AWs and other guns is presented in Table 6-1. Changes in gun murders are also shown in Table 6-1 to emphasize the differences in trends for tracing and gun crime. Below, we summarize key points from the analysis. Due to the instrumentation problems inherent in tracing data, statistical tests are not presented.[42]

Figure 6-1. Police Recoveries of Assault Weapons Reported to ATF (National), 1990-2002



Includes Intratec group, SWD group, AR-15 group, and selected Calico and Feather models.

[42] Nearly 30% of the tracing records lack specific gun model designations (the crucial elements for conducting a trace are the gun make and serial number). For the makes and types of guns likely to be AWs, however, the missing model rate was slightly under 10%. Further, we were able to identity some of the latter weapons as AWs with reasonable confidence based on the makes, types, and calibers alone. Nevertheless, we conducted a supplemental analysis using only those records for which the gun model was identified. The results of that analysis were substantively very similar to those presented below.

Table 6-1. Annual Percentage Changes in Gun Murders and Police Requests to ATF for Traces of Assault Weapons and Other Firearms, 1991-2002 (Number of Traces in Parentheses)

Year	Gun Murders (1)	All Traces (2)	AW Traces* (3)	AP Traces (4)	AR Traces (5)	AW and AW Substitute Traces (6)	Violent Crime Traces (7)	AW Violent Crime Traces (8)	LCMM Rifle Traces** (9)
1991	9%	14% (42281)	14% (2378)	24% (1775)	-6% (603)	14% (2378)	19% (6394)	20% (344)	--
1992	-1%	6% (44992)	1% (2398)	4% (1838)	-7% (560)	1% (2398)	3% (6558)	7% (367)	--
1993	5%	20% (54189)	25% (2994)	20% (2199)	42% (795)	25% (2994)	26% (8248)	41% (516)	252% (183)
1994	-4%	53% (82791)	11% (3337)	23% (2706)	-21% (631)	11% (3337)	22% (10083)	-18% (424)	223% (592)
1995	-10%	-6% (77503)	-19% (2730)	-24% (2051)	8% (679)	-18% (2747)	23% (12439)	-15% (362)	-10% (530)
1996	-9%	66% (128653)	12% (3059)	13% (2309)	10% (750)	17% (3214)	67% (20816)	27% (459)	40% (743)
1997	-7%	42% (183225)	31% (4019)	31% (3017)	34% (1002)	36% (4362)	11% (23147)	13% (519)	24% (925)
1998	-11%	5% (192115)	0% (4014)	-9% (2751)	26% (1263)	7% (4681)	3% (23844)	-22% (404)	33% (1227)
1999	-8%	-2% (188296)	-11% (3581)	-12% (2414)	-8% (1167)	-6% (4406)	3% (24663)	0% (404)	-18% (1003)
2000	1%	-3% (182961)	-11% (3196)	-16% (2027)	0% (1169)	-6% (4143)	-13% (21465)	-25% (305)	-14% (859)
2001	-1%	18% (215282)	1% (3238)	5% (2138)	-6% (1100)	3% (4273)	20% (25822)	6% (322)	-3% (833)
2002	6%	7% (229525)	19% (3839)	4% (2214)	48% (1625)	12% (4765)	20% (30985)	65% (531)	4% (865)

* Based on Intratec group, SWD group, AR-15 group, and Calico and Feather models.

** Foreign semiautomatic rifles accepting large capacity military magazines (banned by executive order in 1998). (Data are not shown for 1991 and 1992 because very few of these guns were traced in those years.)

6.2.2.1. Assault Weapons as a Percentage of Crime Gun Traces

As shown in Figure 6-1, AWs declined from 5.4% of crime gun traces in 1992-1993 to 1.6% in 2001-2002, a decline of 70%. Although this downward trend could be attributable in large part to changes in tracing practices, it is noteworthy that it did not begin until 1994 (the year of the ban); during the pre-ban years, 1990 to 1993, AWs accounted for a steady share of traces despite a 46% increase in total tracing volume. It is also remarkable that about 3,200 AWs were traced in both 2000 and 2001, which is virtually identical to the average number traced during 1993 and 1994 (3,166) even though total traces increased more than 190% during the same period (Table 6-1, columns 2 and 3).[43]

6.2.2.2. Annual Changes in Traces for Assault Weapons and Other Guns

Throughout most of the post-ban period (particularly 1995 to 2001), AW traces either increased less or declined more than total traces (Table 6-1, columns 2 and 3), a pattern that is also consistent with a decline in the use of AWs relative to other guns, though it too may be distorted by changes in tracing practices. This pattern was largely consistent whether analyzing all traces or only traces associated with violent crimes (columns 7 and 8).[44]

The years when total traces declined or were relatively flat are arguably the most informative in the series because they appear to have been less affected by changes in tracing practices. For example, there was a 6% decline in total trace requests from 1994 to 1995 (the years featured in our earlier study) that coincided with a 10% drop in gun murders (Table 6-1, column 1). Therefore, it seems tracing practices were relatively stable (or, conversely, reporting effects were relatively small) from 1994 to 1995. The 19% reduction in AW traces during this same period implies that AW use was declining faster than that of other guns. Furthermore, there were fewer AW traces in 1995 than in 1993, the year prior to the ban. The fact that this occurred during a period when the AW issue was very prominent (and hence police might have been expected to trace more of the AWs they recovered) arguably strengthens the causal inference of a ban effect.[45]

Total traces also declined slightly (2%-3%) in 1999 and 2000. In each of those years, the decline was greater for AWs (11%). Thus, in years when tracing declined overall, AW traces fell 3 to 6 times faster than did total traces. Put another way, AWs fell between 9% and 13% as a percentage of all traces in each of these years.

The general pattern of AW traces increasing less or declining more than those of

[43] These general findings are consistent with those of other tracing analyses conducted by ATF (2003 Congressional Q&A memo provided to the author) and the Brady Center to Prevent Gun Violence (2004).

[44] A caveat is that requests without specific crime type information are often grouped with weapons offenses (ATF, 1999). Therefore, traces associated with violent crimes are likely understated to some degree.

[45] This inference is also supported by our earlier finding that trace requests for AWs declined by only 8% in states that had their own AW bans prior to the federal ban (Roth and Koper, 1997, Chapter 5).

other crime guns was clearly apparent for APs but less consistent for ARs (Table 6-1, columns 4 and 5). For example, AR traces went up 26% in 1998 while total traces went up only 5% and AP traces declined 9%. In 2000, total and AP traces fell 3% and 16%, respectively, but AR traces remained flat. This is consistent with predictions derived from the price and production analyses described above. But note that the post-ban AR counts could be overstated because the data do not distinguish pre-ban from post-ban versions of some popular AR-15 type rifles like the Colt Sporter and Bushmaster XM-15. (Also note that the percentage of traces for ARs did fall from 1.4% in 1992-1993 to 0.6% in 2001-2002.)

More generally, the use of post-ban AW-type weapons (including both legalized APs and ARs) has not been widespread enough to completely offset the apparent decline in the use of banned AWs. Combined traces for banned AWs and AW substitutes (Table 6-1, column 6) also followed the pattern of increasing less or declining more than did total traces throughout most of the period, though the differences were not as pronounced as those between AWs and total traces. In 1999 and 2000, for example, AWs traces dropped 11%, while combined traces for AWs and legal substitutes declined only 6%. Still, the latter figure was greater than the 2%-3% drop for total traces.

Finally, traces of the LCMM rifles banned by executive order in 1998 were generally rising to that point, reaching levels as high as those for AR-15 type rifles (Table 6-1, column 9). Since 1998, however, the number of traces for LCMM rifles has fallen substantially. Despite a 4% increase from 2001 to 2002, the number of LCMM traces in 2002 (865) was 30% lower than the peak number traced in 1998 (1,227). Tentatively, this suggests that the 1998 extension of the ban has been effective in curtailing weapons that offenders may have been substituting for the ARs banned in 1994.

6.2.2.3. Did Use of Assault Weapons Rebound in 2002?

In 2002, tracing volume increased 7%, which closely matched the 6% increase in gun murders for that year. In contrast to the general pattern, AW traces increased by 19%, suggesting a possible rebound in AW use independent of changes in tracing practices, a development that we have predicted elsewhere (Roth and Koper, 1997) based on the boom in AW production leading up to the ban. The disproportionate growth in AW traces was due to ARs, however, so it could partially reflect increasing use of post-ban AR-type rifles (see the discussion above).

Moreover, this pattern could be illusory. With data from the most recent years, it was possible to run a supplementary analysis screening out traces of older weapons (not shown). Focusing on just those guns recovered and traced in the same year for 2000 through 2002 revealed that recoveries of AWs declined in 2001, more so for ARs (16%) than for APs (9%), while total traces increased 1%.[46] Traces for APs and ARs then

[46] The tracing database indicates when guns were recovered and when they were traced. However, the recovery dates were missing for 30% of the records overall and were particularly problematic for years prior to 1998. For this reason, the main analysis is based on request dates. The auxiliary analysis for 2000-

increased in 2002 (1% and 6%, respectively) but by less than total traces (8%). Therefore, the disproportionate growth in AR traces in 2002 shown in Table 6-1 may have been due to tracing of older AWs by newly participating police agencies.

6.2.2.4. Summary of the ATF Gun Tracing Analysis

Complexities arising from recent changes in the use of gun tracing by law enforcement warrant caution in the interpretation of ATF gun tracing data. Notwithstanding, the data suggest that use of AWs in crime, though relatively rare from the start, has been declining. The percentage of gun traces that were for AWs plummeted 70% between 1992-1993 and 2001-2002 (from 5.4% to 1.6%), and this trend did not begin until the year of the AW ban. On a year-to-year basis, AW traces generally increased less or declined by more than other gun traces. Moreover, in years when tracing volume declined – that is, years when changes in reporting practices were least likely to distort the data – traces of AWs fell 3 to 6 times faster than gun traces in general. The drop in AW use seemed most apparent for APs and LCMM rifles (banned in 1998). Inferences were less clear for domestic ARs, but assessment of those guns is complicated by the possible substitution of post-ban legal variations.

6.3. Local Analyses of Guns Recovered By Police

Due to concerns over the validity of national ATF tracing data for investigating the types of guns used in crime, we sought to confirm the preceding findings using local data on guns recovered by police. To this end, we examined data from half a dozen localities and time periods.

- All guns recovered by the Baltimore Police Department from 1992 to 2000 (N=33,933)
- All guns recovered by the Metro-Dade Police Department (Miami and Dade County, Florida) from 1990 to 2000 (N=39,456)
- All guns recovered by the St. Louis Police Department from 1992 to 2003 (N=34,143)
- All guns recovered by the Boston Police Department (as approximated by trace requests submitted by the Department to ATF) from 1991 to 1993 and 2000 to 2002 (N=4,617)[47]

2002 focuses on guns both recovered and traced in the same year because it is likely that some guns recovered in 2002 had not yet been traced by the spring of 2003 when this database was created. Using only guns recovered and traced in the same year should mitigate this bias.

[47] The Boston Police Department has been tracing guns comprehensively since 1991 (Kennedy et al., 1996). However, we encountered difficulties in identifying Boston Police Department traces for several years in the mid-1990s. For this reason, we chose to contrast the 1991 to 1993 period with the 2000 to 2002 period.

- Guns recovered during murder investigations in Milwaukee County from 1991 to 1998 (N=592)[48]
- Guns linked to serious crimes in Anchorage and other parts of Alaska and submitted to state firearm examiners for evidentiary testing from 1987 to 2000 (N=900)[49]

The selection of these particular locations and samples reflects data availability.[50] The locations were not selected randomly, and some of the samples are small for conducting trend analysis of relatively rare events (i.e., AW recoveries). Accordingly, we must use caution in generalizing the results to other places. However, the data sources reflect a wide geographic range and cover post-ban periods extending through at least the latter 1990s (and typically through the year 2000 or beyond). To the extent that the results are similar across these jurisdictions, therefore, we can have more confidence that they reflect national patterns.

In each jurisdiction, we examined pre-post changes in recoveries of AWs (focusing on the domestic AW group defined earlier) and substitution of post-ban AW models for the banned models. Where possible, we conducted separate analyses of all AW recoveries and those linked specifically to violent crimes.[51] We also differentiated between AP and AR trends using the larger databases from Baltimore, Miami, and St. Louis. But since most of these databases do not extend more than two years beyond 1998, we do not present analyses specifically for LCMM rifles.

Key summary results are summarized in Table 6-2, while more detailed results from each site appear at the end of the chapter in Tables 6-3 through 6-6 and Figures 6-2 through 6-6.[52] The number of AW recoveries declined by 28% to 82% across these

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[48] The data are described in reports from the Medical College of Wisconsin (Hargarten et al., 1996; 2000) and include guns used in the murders and other guns recovered at the crime scenes. Guns are recovered in approximately one-third of Milwaukee homicide cases.

[49] The data include guns submitted by federal, state, and local agencies throughout the state. Roughly half come from the Anchorage area. Guns submitted by police to the state lab are most typically guns that were used in major crimes against persons (e.g. murder, attempted murder, assault, robbery).

[50] We contacted at least 20 police departments and crime labs in the course of our data search, focusing much of our attention on police departments participating in ATF's Youth Crime Gun Interdiction Initiative (YCGII) (ATF, 1997; 1999). Departments participating in the YCGII submit data to ATF on all guns that they recover. Though the YCGII did not begin until 1996 (well after the implementation of the AW ban), we suspected that these departments would be among those most likely to have electronically-stored gun data potentially extending back in time to before the ban. Unfortunately, most of these departments either did not have their gun data in electronic format or could not provide data for other reasons (e.g., resource constraints). In the course of our first AW study (Roth and Koper, 1997), we contacted many other police departments that also did not have adequate data for the study.

[51] All of the Milwaukee and Anchorage analyses were limited to guns involved in murders or other serious crimes. Despite evidence of a decline, AW recoveries linked to violence were too rare in Boston to conduct valid test statistics.

[52] We omitted guns recovered in 1994 from both the pre and post-ban counts because the speculative price increases for AWs that occurred in 1994 (see previous section and Roth and Koper, 1997, Chapter 4) raise questions about the precise timing of the ban's impact on AW use during that year, thereby clouding the designation of the intervention point. This is particularly a concern for the Baltimore analysis due to a

locations and time periods, but the discussion below focuses on changes in AWs as a share of crime guns in order to control for general trends in gun crime and gun seizures. Prior to the ban, AWs ranged from about 1% of guns linked to violent crimes in St. Louis to nearly 6% of guns recovered in Milwaukee murder cases.[53]

AWs dropped as share of crime guns in all jurisdictions after the ban. Reductions ranged from a low of 17% in Milwaukee (based on guns linked to homicides) to a high of 72% in Boston (based on all crime guns) but were generally between 32% and 40%.[54, 55] A decline in the use of AWs relative to other guns was generally apparent whether examining all AW recoveries or just those linked to violent crimes.[56] An exception was in St. Louis, where

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state AP ban that took effect a few months prior to the federal AW ban.

[53] These figures should be treated as approximations of the prevalence of AWs. On the one hand, the numbers may understate the prevalence of AWs to a small degree because they are based on only the domestic AW group defined earlier. Based on analysis of national ATF gun tracing data, we estimated previously that the domestic AW group accounts for 82% of AWs used in crime (Roth and Koper, 1997, Chapter 5). To further test the reliability of this assessment, we investigated the prevalence of all banned AW models among guns recovered in Baltimore using an ATF list of all guns defined as AWs under the 1994 Crime Act criteria (118 model and caliber combinations). We chose the Baltimore database because it provides a complete inventory of guns recovered by police in that city during the study period and, having been maintained by crime lab personnel, is particularly thorough with regard to make and model identifications. Though there was some ambiguity in classifying a small number of AK-type semiautomatic rifles (there are many civilian variations of the AK-47 rifle, some of which were legal under the 1994 legislation), our examination suggested that the domestic AW group accounted for approximately 90% of the AWs recovered in Baltimore. (In addition, including all AWs had virtually no effect on the pre-post changes in AW use in Baltimore.) But as discussed previously, the counts could also overstate AW use to some degree because imprecision in the identification of gun models in some data sources may have resulted in some legalized firearms being counted as banned AWs.

[54] The AW counts for Miami also include Interdynamics KG9 and KG99 models. These models were produced during the early 1980s and were forerunners to the Intratec models (ATF restricted the KG9 during the early 1980s because it could be converted too easily to fully automatic fire). These weapons were very rare or non-existent in most of the local data sources, but they were more common in Miami, where Interdynamics was formerly based. Including these guns increased the AW count in Miami by about 9% but did not affect pre-post changes in AW recoveries.

[55] State AW legislation passed in Maryland and Massachusetts could have had some impact on AW trends in Baltimore and Boston, respectively. Maryland implemented an AP ban, similar in coverage to the federal AW ban, in June 1994 (Maryland has also required background checks for retail sales of a broader list of state-defined AWs since 1989), and Massachusetts implemented additional legislation on federally-defined AWs in late 1998. The timing and scope of these laws make them largely redundant with the federal ban, so they should not unduly complicate inferences from the analysis. However, Maryland forbids additional transfers of grandfathered APs, and Massachusetts has imposed additional requirements for possession and transfer of LCMs and guns accepting LCMs. Both states also have enhanced penalties for certain crimes involving APs, LCMs, and/or guns accepting LCMs. Hence, the ban on AWs was arguably strengthened in Baltimore and Boston, relative to the other jurisdictions under study. This does not appear to have affected trends in AW use in Baltimore, which were very similar to those found in the other study sites. However, use of AWs and combined use of AWs and post-ban AW substitutes declined more in Boston than in any other study site. Although the trends in Boston could reflect ongoing, post-2000 reductions in use of AWs and similar weapons (Boston was one of the only study sites from which we obtained post-2000 data), it is possible that the Massachusetts legislation was also a contributing factor.

[56] There may be some inconsistency across jurisdictions in the identification of guns associated with violent crimes. In Miami, for example, 28% of the guns had an offense code equal to "other/not listed," and this percentage was notably higher for the later years of the data series.

Table 6-2. Pre-Post Changes in Assault Weapons As a Share of Recovered Crime Guns For Selected Localities and Time Periods: Summary Results (Total Number of Assault Weapons for Pre and Post Periods in Parentheses) [a]

Locality and Time Period	AWs	AWs (Linked to Violence)	APs	ARs	AWs and Post-Ban Substitutes
Baltimore (all recoveries) pre=1992-1993, post=1995-2000	-34%*** (425)	-41%** (75)	-35%*** (383)	-24% (42)	-29%*** (444)
Miami-Dade (all recoveries) pre=1990-1993, post=1995-2000	-32%*** (733)	-39%*** (101)	-40%*** (611)	37%* (115)	-30%*** (746)
St. Louis (all recoveries) pre=1992-1993, post=1995-2003	-32%*** (306)	1% (28)	-34%*** (274)	10% (32)	-24%** (328)
Boston (all recoveries) pre=1991-1993, post=2000-2002	-72%*** (71)	N/A	N/A	N/A	-60%*** (76)
Milwaukee (recoveries in murder cases) pre=1991-1993, post=1995-1998	N/A	-17% (28)	N/A	N/A	2% (31)
Anchorage, AK (recoveries in serious crimes) pre=1987-1993, post=1995-2000	N/A	-40% (24)	N/A	N/A	-40% (24)

a. Based on Intratec group, SWD group, AR-15 group, and Calico and Feather models. See the text for additional details about each sample and Tables 6-3 through 6-6 for more detailed results from each locality.

* Statistically significant change at chi-square p level < .1

** Statistically significant change at chi-square p level < .05

*** Statistically significant change at chi-square p level < .01

AWs declined as share of all guns but not of guns linked to violent crimes, though the latter test was based on rather small samples.

These reductions were not due to any obvious pre-ban trends (see Figures 6-2 through 6-6 at the end of the chapter). On the contrary, AW recoveries reached a peak in most of these jurisdictions during 1993 or 1994 (Boston, which is not shown in the graphs due to missing years, was an exception). We tested changes in AW prevalence using simple chi-square tests since there were no observable pre-existing time trends in the data. Due to the small number of AWs in some of these samples, these changes were not all statistically significant. Nonetheless, the uniformity of the results is highly suggestive, especially when one considers the consistency of these results with those found in the national ATF tracing analysis.

The changes in Tables 6-2 through 6-6 reflect the average decline in recoveries of AWs during the post-ban period in each locality. However, some of these figures may understate reductions to date. In several of the localities, the prevalence of AWs among crime guns was at, or close to, its lowest mark during the most recent year analyzed (see Figures 6-2 through 6-6 at the end of the chapter), suggesting that AW use continues to decline. In Miami, for example, AWs accounted for 1.7% of crime guns for the whole 1995 to 2000 period but had fallen to 1% by 2000. Further, the largest AW decline was recorded in Boston, one of two cities for which data extended beyond the year 2000 (however, this was not the case in St. Louis, the other locality with post-2000 data).

Breakouts of APs and ARs in Baltimore, Miami, and St. Louis show that the decline in AW recoveries was due largely to APs, which accounted for the majority of AWs in these and almost all of the other localities (the exception was Anchorage, where crimes with rifles were more common, as a share of gun crimes, than in the other sites). Pre-post changes in recoveries of the domestic AR group weapons, which accounted for less than 1% of crime guns in Baltimore, Miami, and St. Louis, were inconsistent. AR recoveries declined after the ban in Baltimore but increased in St. Louis and Miami. As discussed previously, however, the AR figures may partly reflect the substitution of post-ban, legalized versions of these rifles, thus overstating post-ban use of the banned configurations. Further, trends for these particular rifles may not be indicative of those for the full range of banned rifles, including the various foreign rifles banned by the 1994 law and the import restrictions of 1989 and 1998 (e.g., see the ATF gun tracing analysis of LCMM rifles).[57]

[57] As discussed in the last chapter, our research design focused on common AWs that were likely to be most affected by the 1994 ban as opposed to earlier regulations (namely, the 1989 import ban) or other events (e.g., company closings or model discontinuations prior to 1994). However, an auxiliary analysis with the Baltimore data revealed a statistically meaningful drop in recoveries of all ARs covered by the 1994 legislation (not including the LCMM rifles) that was larger than that found for just the domestic group ARs discussed in the text. Similarly, an expanded AR analysis in Miami showed that total AR recoveries declined after the ban, in contrast to the increase found for the domestic group ARs. (Even after expanding the analysis, ARs still accounted for no more than 0.64% of crime guns before the ban in both locations. As with the domestic AR group, there are complexities in identifying banned versus non-banned versions of some of the other ARs, so these numbers are approximations.) Consequently, a more nuanced view of AR trends may be that AR use is declining overall, but this decline may be due largely to the 1989 import

Finally, the overall decline in AW use was only partially offset by substitution of the post-ban legalized models. Even if the post-ban models are counted as AWs, the share of crime guns that were AWs still fell 24% to 60% across most jurisdictions. The exception was Milwaukee where recoveries of a few post-ban models negated the drop in banned models in a small sample of guns recovered during murder investigations.[58]

6.4. Summary

Consistent with predictions derived from the analysis of market indicators in Chapter 5, analyses of national ATF gun tracing data and local databases on guns recovered by police in several localities have been largely consistent in showing that criminal use of AWs, while accounting for no more than 6% of gun crimes even before the ban, declined after 1994, independently of trends in gun crime. In various places and times from the late 1990s through 2003, AWs typically fell by one-third or more as a share of guns used in crime.[59, 60] Some of the most recent, post-2000 data suggest

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restrictions that predated the AW ban. It is not yet clear that there has been a decline in the most common ARs prohibited exclusively by the 1994 ban.

[58] This was not true when focusing on just those guns that were used in the incident as opposed to all guns recovered during the investigations. However, the samples of AWs identified as murder weapons were too small for valid statistical tests of pre-post changes.

[59] These findings are also supported by prior research in which we found that reported thefts of AWs declined 7% in absolute terms and 14% as a fraction of stolen guns in the early period following the ban (i.e., late 1994 through early 1996) (Koper and Roth, 2002a, p. 21). We conducted that analysis to account for the possibility that an increase in thefts of AWs might have offset the effect of rising AW prices on the availability of AWs to criminals. Because crimes with AWs appear to have declined after the ban, the theft analysis is not as central to the arguments in this paper.

[60] National surveys of state prisoners conducted by the federal Bureau of Justice Statistics show an increase from 1991 to 1997 in the percentage of prisoners who reported having used an AW (Beck et al., 1993; Harlow, 2001). The 1991 survey (discussed in Chapter 3) found that 2% of violent gun offenders had carried or used an AW in the offense for which they were sentenced (calculated from Beck et al. 1993, pp. 18,33). The comparable figure from the 1997 survey was nearly 7% (Harlow, 2001, pp.3, 7).

Although these figures appear contrary to the patterns shown by gun recovery data, there are ambiguities in the survey findings that warrant caution in such an interpretation. First, the definition of an AW (and most likely the respondents' interpretation of this term) was broader in the 1997 survey. For the 1991 survey, respondents were asked about prior ownership and use of a "…military-type weapon, such as an Uzi, AK-47, AR-15, or M-16" (Beck et al., 1993, p. 18), all of which are ARs or have AR variations. The 1997 survey project defined AWs to "…include the Uzi, TEC-9, and the MAC-10 for handguns, the AR-15 and AK-47 for rifles, and the 'Street Sweeper' for shotguns" (Harlow, 2001, p. 2). (Survey codebooks available from the Inter-University Consortium for Political and Social Research also show that the 1997 survey provided more detail and elaboration about AWs and their features than did the 1991 survey, including separate definitions of APs, ARs, and assault shotguns.)

A second consideration is that many of the respondents in the 1997 survey were probably reporting criminal activity prior to or just around the time of the ban. Violent offenders participating in the survey, for example, had been incarcerated nearly six years on average at the time they were interviewed (Bureau of Justice Statistics, 2000, p. 55). Consequently, the increase in reported AW use may reflect an upward trend in the use of AWs from the 1980s through the early to mid 1990s, as well as a growing recognition of these weapons (and a greater tendency to report owning or using them) stemming from publicity about the AW issue during the early 1990s.

Finally, we might view the 1997 estimate skeptically because it is somewhat higher than that from most other sources. Nevertheless, it is within the range of estimates discussed earlier and could reflect a

reductions as high as 70%.[61] This trend has been driven primarily by a decline in the use of APs, which account for a majority of AWs used in crime. AR trends have been more varied and complicated by the substitution of post-ban guns that are very similar to some banned ARs. More generally, however, the substitution of post-ban AW-type models with fewer military features has only partially offset the decline in banned AWs.

These findings raise questions as to the whereabouts of surplus AWs, particularly APs, produced just prior to the ban. Presumably, many are in the hands of collectors and speculators holding them for their novelty and value.[62] Even criminal possessors may be more sensitive to the value of their AWs and less likely to use them for risk of losing them to police.

Finally, it is worth noting the ban has not completely eliminated the use of AWs, and, despite large relative reductions, the share of gun crimes involving AWs is similar to that before the ban. Based on year 2000 or more recent data, the most common AWs continue to be used in up to 1.7% of gun crimes.

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somewhat higher use of AWs among the subset of offenders who are most active and/or dangerous; recall that the highest estimate of AW use among the sources examined in this chapter came from a sample of guns recovered during murder investigations in Milwaukee (also see the discussion of offender surveys and AWs in Chapter 3).

[61] Developing a national estimate of the number of AW crimes prevented by the ban is complicated by the range of estimates of AW use and changes therein derived from different data sources. Tentatively, nonetheless, it appears the ban prevents a few thousand crimes with AWs annually. For example, using 2% as the best estimate of the share of gun crimes involving AWs prior to the ban (see Chapter 3) and 40% as a reasonable estimate of the post-ban drop in this figure implies that almost 2,900 murders, robberies, and assaults with AWs were prevented in 2002 (this assumes that 1.2% of the roughly 358,000 gun murders, gun robberies, and gun assaults reported to police in 2002 [see the *Uniform Crime Reports*] involved AWs but that 2% would have involved AWs had the ban not been in effect). Even if this estimate is accurate, however, it does not mean the ban prevented 2,900 gun crimes in 2002; indeed, the preceding calculation assumes that offenders prevented from using AWs committed their crimes using other guns. Whether forcing such weapon substitution can reduce the number of persons wounded or killed in gun crimes is considered in more detail in Chapter 9.

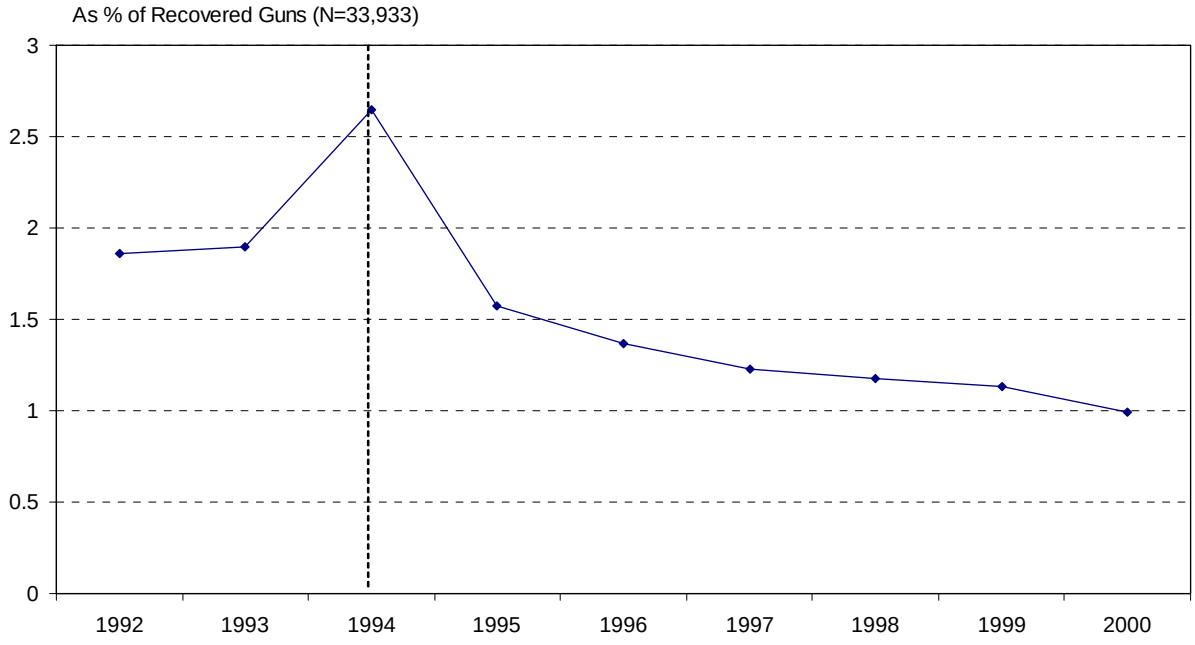
[62] The 1997 national survey of state prisoners discussed in footnote 60 found that nearly 49% of AW offenders obtained their gun from a “street” or illegal source, in contrast to 36% to 42% for other gun users (Harlow, 2001, p. 9). This could be another sign that AWs have become harder to acquire since the ban, but the data cannot be used to make an assessment over time.

Table 6-3. Trends in Police Recoveries of Domestic Assault Weapons in Baltimore, 1992-2000 [a]

	Pre-Ban Period	Post-Ban Period	Change
A. All Recoveries	Jan. 1992-Dec. 1993	Jan. 1995-Dec. 2000	
Total AWs	135	290	
Annual Mean	67.5	48.33	-28%
AW's as % of Guns	1.88%	1.25%	-34%**
APs	123	260	
Annual Mean	61.5	43.33	-30%
APs as % of Guns	1.71%	1.12%	-35%**
ARs	12	30	
Annual Mean	6	5	-17%
ARs as % of Guns	0.17%	0.13%	-24%
Total AWs and Substitutes	135	309	
Annual Mean	67.5	51.5	-24%
AWs/Subs as % of Guns	1.88%	1.33%	-29%**
B. Recoveries Linked to Violent Crimes [b]			
Total AWs	28	47	
Annual Mean	14	7.83	-44%
AWs as % of Violent Crime Guns	2.1%	1.24%	-41%*

a. Domestic assault weapons include Intratec group, SWD group, AR-15 group, and Calico and Feather models.
b. Murders, assaults, and robberies
* Chi-square p level < .05 (changes in percentages of guns that were AWs/APs/ARs/AW-subs were tested for statistical significance).
** Chi-square p level < .01 (changes in percentages of guns that were AWs/APs/ARs/AW-subs were tested for statistical significance).

Figure 6-2. Police Recoveries of Assault Weapons in Baltimore, 1992-2000



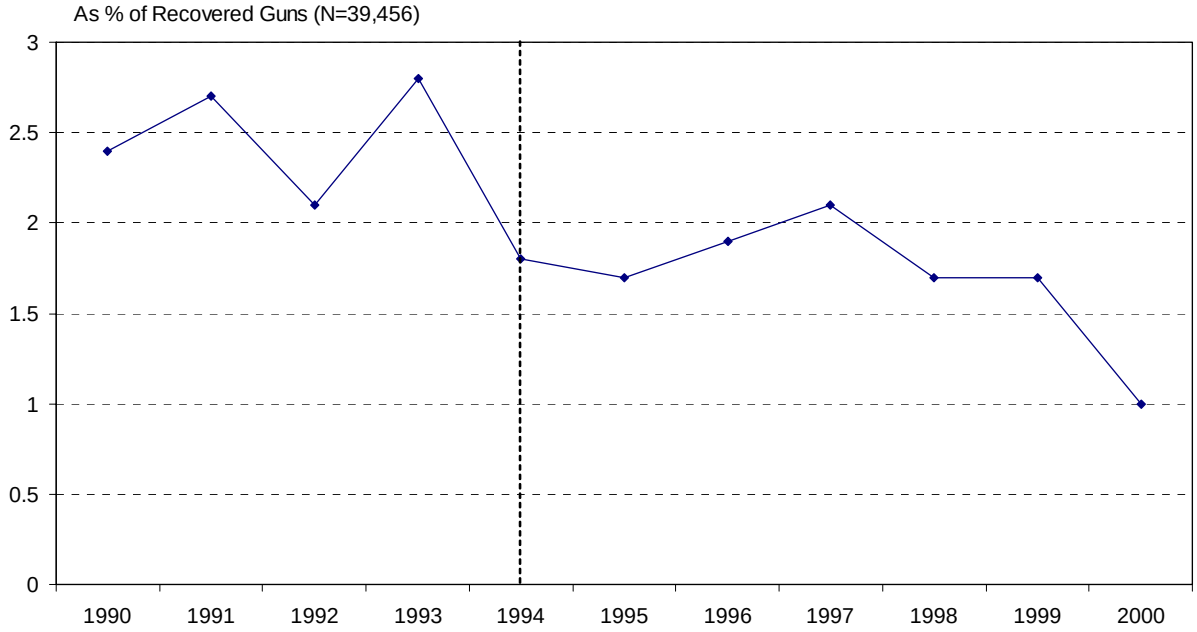
Includes Intratec group, SWD group, AR-15 group, and selected Calico and Feather models.

Table 6-4. Trends in Police Recoveries of Domestic Assault Weapons in Miami (Metro-Dade), 1990-2000 [a]

	Pre-Ban Period	Post-Ban Period	Change
A. All Recoveries	Jan. 1990-Dec. 1993	Jan. 1995-Dec. 2000	
Total AWs	403	330	
Annual Mean	100.75	55	-45%
AW's as % of Guns	2.53%	1.71%	-32%***
APs	355	256	
Annual Mean	88.75	42.67	-52%
APs as % of Guns	2.23%	1.33%	-40%***
ARs	43	72	
Annual Mean	10.75	12	12%
ARs as % of Guns	0.27%	0.37%	37%*
Total AWs and Substitutes	403	343	
Annual Mean	100.75	57.17	-43%
AWs/Subs as % of Guns	2.53%	1.78%	-30%***
B. Recoveries Linked to Violent Crimes [b]			
Total AWs	69	32	
Annual Mean	17.25	5.33	-69%
AWs as % of Violent Crime Guns	2.28%	1.39%	-39%**

a. Domestic assault weapons include Intratec group, SWD group, AR-15 group, and Calico and Feather models.
b. Murders, assaults, and robberies
* Chi-square p level < .1 (changes in percentages of guns that were AWs/APs/ARs/AW-subs were tested for statistical significance)
** Chi-square p level < .05 (changes in percentages of guns that were AWs/APs/ARs/AW-subs were tested for statistical significance)
*** Chi-square p level <.01 (changes in percentages of guns that were AWs/APs/ARs/AW-subs were tested for statistical significance)

Figure 6-3. Police Recoveries of Assault Weapons in Miami (Metro-Dade), 1990-2000



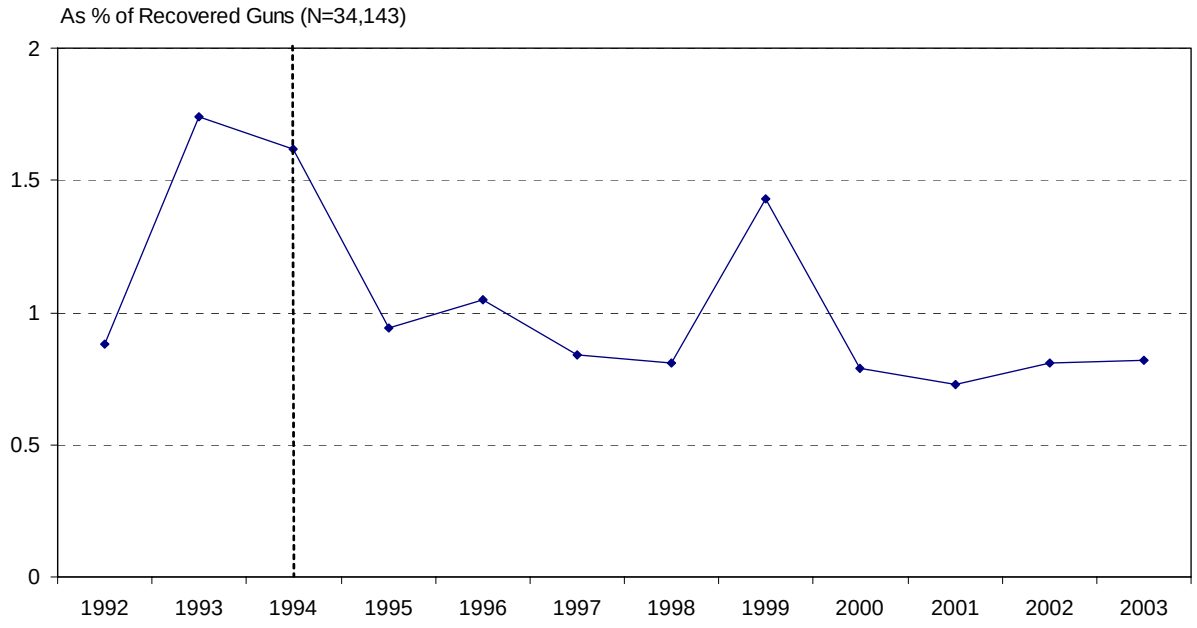
Includes Intratec group, SWD group, AR-15 group, and selected Calico and Feather models.

Table 6-5. Trends in Police Recoveries of Domestic Assault Weapons in St. Louis, 1992-2003 [a]

	Pre-Ban Period	Post-Ban Period	Change
A. All Recoveries	Jan. 1992-Dec. 1993	Jan. 1995-Dec. 2003	
Total AWs	94	212	
Annual Mean	47	23.56	-50%
AW's as % of Guns	1.33%	0.91%	-32%**
APs	87	187	
Annual Mean	43.5	20.78	-52%
APs as % of Guns	1.23%	0.81%	-34%**
ARs	7	25	
Annual Mean	3.5	2.78	-21%
ARs as % of Guns	0.1%	0.11%	10%
Total AWs and Substitutes	94	234	
Annual Mean	47	26	-45%
AWs/Subs as % of Guns	1.33%	1.01%	-24%*
B. Recoveries Linked to Violent Crimes [b]			
Total AWs	8	20	
Annual Mean	4	2.2	-45%
AWs as % of Violent Crime Guns	0.8%	0.81%	1%

a. Domestic assault weapons include Intratec group, SWD group, AR-15 group, and Calico and Feather models.
b. Murders, assaults, and robberies
* Chi-square p level < .05 (changes in percentages of guns that were AWs/APs/ARs/AW-subs were tested for statistical significance)
** Chi-square p level <.01 (changes in percentages of guns that were AWs/APs/ARs/AW-subs were tested for statistical significance)

Figure 6-4. Police Recoveries of Assault Weapons in St. Louis, 1992-2003



Includes Intratec group, SWD group, AR-15 group, and selected Calico and Feather models.

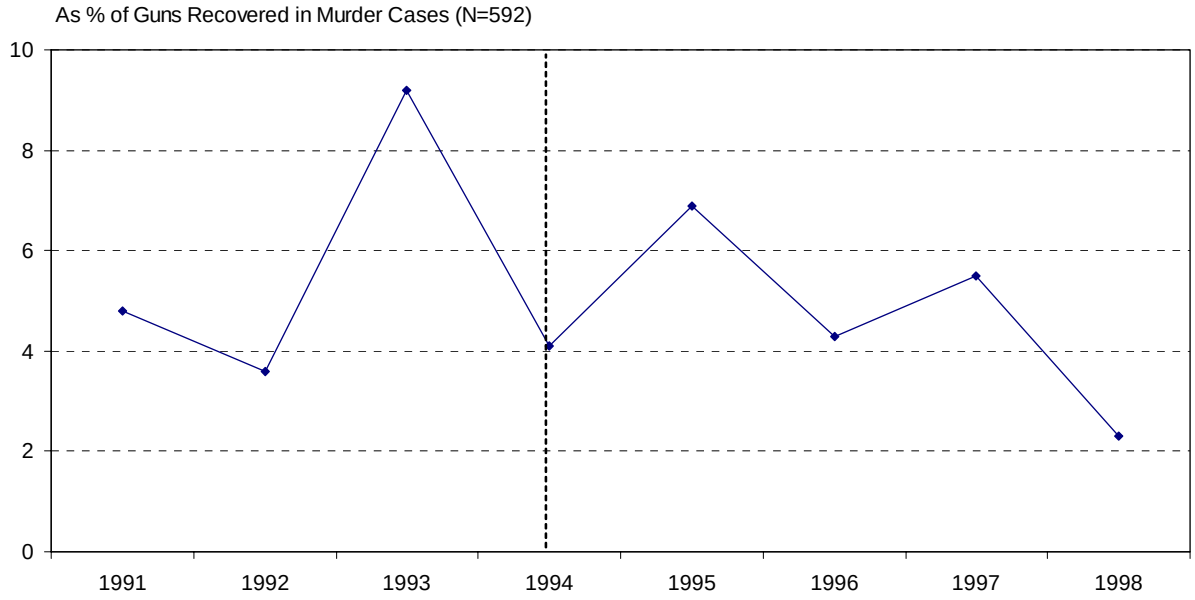
Table 6-6. Trends in Police Recoveries of Domestic Assault Weapons in Boston, Milwaukee, and Anchorage (Alaska) [a]

	Pre-Ban Period	Post-Ban Period	Change
Boston	Jan. 1991-Dec. 1993	Jan. 2000-Dec. 2002	
(All Gun Traces)			
AWs	60	11	
Annual Mean	20	3.7	-82%
AWs as % of Guns	2.16%	0.6%	-72%*
AWs and Substitutes	60	16	
Annual Mean	20	5.3	-74%
AWs/Subs as % of Guns	2.16%	0.87%	-60%*
Milwaukee	Jan. 1991-Dec. 1993	Jan. 1995-Dec. 1998	
(Guns Recovered in Murder Cases)			
AWs	15	13	
Annual Mean	5	3.25	-35%
AWs as % of Guns	5.91%	4.91%	-17%
AWs and Substitutes	15	16	
Annual Mean	5	4	-20%
AWs/Subs as % of Guns	5.91%	6.04%	2%
Anchorage	Jan. 1987-Dec. 1993	Jan. 1995-Dec. 2000	
(Guns Tested for Evidence)			
AWs	16	8	
Annual Mean	2.29	1.33	-42%
AW's as % of Guns	3.57%	2.13%	-40%
AWs and Substitutes	N/A	N/A	

a. Domestic assault weapons include Intratec group, SWD group, AR-15 group, and Calico and Feather models.

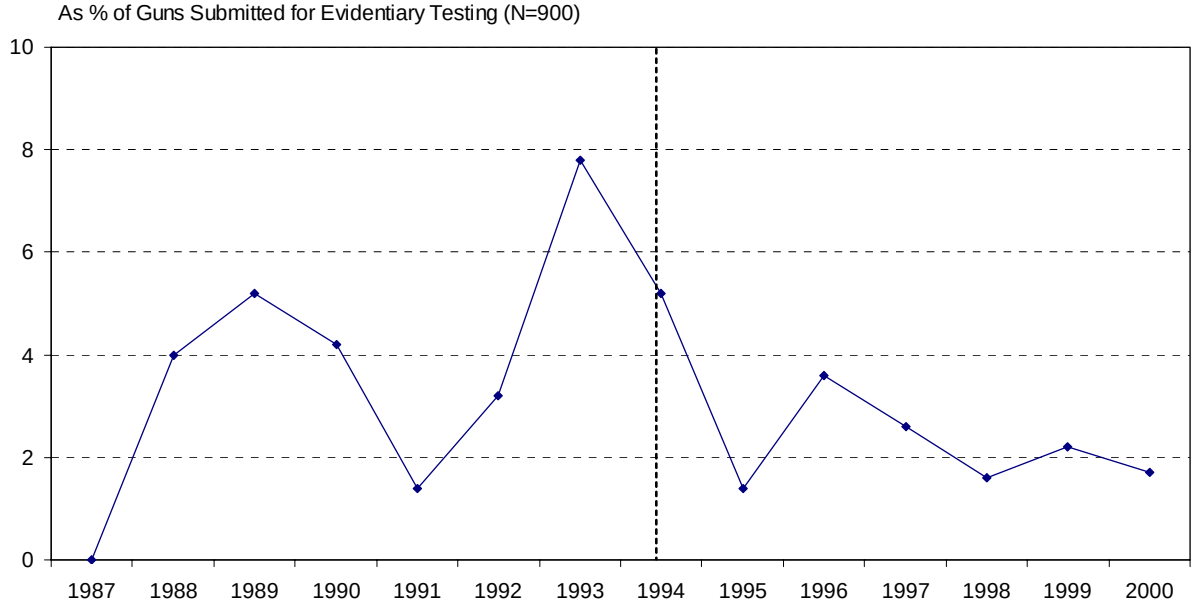
* Chi-square p level < .01 (changes in percentages of guns that were AWs/AW-subs were tested for statistical significance)

Figure 6-5. Assault Weapons Recovered in Milwaukee County Murder Cases, 1991-1998



Includes Intratec group, SWD group, AR-15 group, and selected Calico and Feather models.

Figure 6-6. Police Recoveries of Assault Weapons in Anchorage (Alaska), 1987-2000



Includes Intratec group, SWD group, AR-15 group, and selected Calico and Feather models.

7. MARKET INDICATORS FOR LARGE CAPACITY MAGAZINES: PRICES AND IMPORTATION

The previous chapters examined the AW-LCM ban's impact on the availability and criminal use of AWs. In this chapter and the next, we consider the impact of the ban's much broader prohibition on LCMs made for numerous banned and non-banned firearms. We begin by studying market indicators. Our earlier study of LCM prices for a few gun models revealed that prices rose substantially during 1994 and into 1995 (Roth and Koper, 1997, Chapter 4). Prices of some LCMs remained high into 1996, while others returned to pre-ban levels or oscillated more unpredictably. The price increases may have reduced LCM use at least temporarily in the short-term aftermath of the ban, but we could not confirm this in our prior investigation.

7.1. Price Trends for Large Capacity Magazines

For this study, we sought to approximate longer term trends in the prices at which users could purchase banned LCMs throughout the country. To that end, we analyzed quarterly data on the prices of LCMs advertised by eleven gun and magazine distributors in *Shotgun News*, a national gun industry publication, from April 1992 to December 1998.[63] Those prices are available to any gun dealer, and primary market retailers generally re-sell within 15% of the distributors' prices.[64] The distributors were chosen during the course of the first AW study (Roth and Koper, 1997) based on the frequency with which they advertised during the April 1992 to June 1996 period. For each quarterly period, project staff coded prices for one issue from a randomly selected month. We generally used the first issue of each selected month based on a preliminary, informal assessment suggesting that the selected distributors advertised more frequently in those issues. In a few instances, first-of-month issues were unavailable to us or provided too few observations, so we substituted other issues.[65] Also, we were unable to obtain *Shotgun News* issues for the last two quarters of 1996. However, we aggregated the data annually to study price trends, and the omission of those quarters did not appear to affect the results (this is explained further below).

We ascertained trends in LCM prices by conducting hedonic price analyses,

[63] The *Blue Book of Gun Values*, which served as the data source for the AW price analysis, does not contain ammunition magazine prices.

[64] According to gun market experts, retail prices track wholesale prices quite closely (Cook et al., 1995, p. 71). Retail prices to eligible purchasers generally exceed wholesale (or original-purchase) prices by 3% to 5% in the large chain stores, by about 15% in independent dealerships, and by about 10% at gun shows (where overhead costs are lower).

[65] The decision to focus on first-of-month issues was made prior to data collection for price analysis update. For the earlier study (Roth and Koper, 1997), project staff coded data for one or more randomly selected issues of every month of the April 1992 to June 1996 period. For this analysis, we utilized data from only the first-of-month issues selected at random during the prior study. If multiple first-of-month issues were available for a given quarter, we selected one at random or based on the number of recorded advertisements. If no first-of-month issue was available for a given quarter, we selected another issue at random from among those coded during the first study.

similar to those described in the AW price analysis (Chapter 5), in which we regressed inflation-adjusted LCM prices (logged) on several predictors: magazine capacity (logged), gun make (for which the LCM was made), year of the advertisement, and distributor. We cannot account fully for the meaning of significant distributor effects. They may represent unmeasured quality differentials in the merchandise of different distributors, or they may represent other differences in stock volume or selling or service practices between the distributors.[66] We included the distributor indicators when they proved to be significant predictors of advertised price. In addition, we focused on LCMs made for several of the most common LCM-compatible handguns and rifles, rather than try to model the differences in LCM prices between the several hundred miscellaneous makes and models of firearms that were captured in the data. Finally, for both the handgun and rifle models, we created and tested seasonal indicator variables to determine if their incorporation would affect the coefficient for 1996 (the year with winter/spring data only), but they proved to be statistically insignificant and are not shown in the results below.[67]

7.1.1. Large Capacity Magazines for Handguns

The handgun LCM analysis tracks the prices of LCMs made for Intratec and Cobray (i.e., SWD) APs and non-banned semiautomatic pistols made by Smith and Wesson, Glock, Sturm Ruger, Sig-Sauer, Taurus, and Beretta (each of the manufacturers in the former group produces numerous models capable of accepting LCMs). In general, LCMs with greater magazine capacities commanded higher prices, and there were significant price differentials between LCMs made for different guns and sold by different distributors (see Table 7-1). Not surprisingly, LCMs made for Glock handguns were most expensive, followed by those made for Beretta and Sig-Sauer firearms.

Turning to the time trend indicators (see Table 7-1 and Figure 7-1), prices for these magazines increased nearly 50% from 1993 to 1994, and they rose another 56% in 1995. Prices declined somewhat, though not steadily, from 1996 to 1998. Nevertheless, prices in 1998 remained 22% higher than prices in 1994 and nearly 80% higher than those in 1993.

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[66] For example, one possible difference between the distributors may have been the extent to which they sold magazines made of different materials (e.g., steel, aluminum, etc.) or generic magazines manufactured by companies other than the companies manufacturing the firearms for which the magazines were made. For example, there were indications in the data that 3% of the handgun LCMs and 10% of the AR-15 and Mini-14 rifle LCMs used in the analyses (described below) were generic magazines. We did not control for these characteristic, however, because such information was often unclear from the advertisements and was not recorded consistently by coders.

[67] Project staff coded all LCM advertisements by the selected distributors. Therefore, the data are inherently weighted. However, the weights are based on the frequency with which the different LCMs were advertised (i.e., the LCMs that were advertised most frequently have the greatest weight in the models) rather than by production volume.

Table 7-1. Regression of Handgun and Rifle Large Capacity Magazine Prices on Annual Time Indicators, 1992-1998, Controlling for Gun Makes/Models and Distributors

	Handgun LCMs (n=1,277)		Rifle LCMs (n=674)	
	Estimate	**T value**	**Estimate**	**T value**
Constant	-1.79	-12.74***	-4.10	-19.12***
1992	-0.19	-2.11**	-0.48	-4.20***
1993	-0.38	-6.00***	-0.55	-6.14***
1995	0.44	6.88***	-0.25	-2.64***
1996	0.29	4.05***	-0.12	-0.93
1997	0.36	6.33***	-0.31	-3.68***
1998	0.20	3.51***	-0.44	-5.19***
Rounds (logged)	0.26	5.73***	0.84	15.08***
Cobray	-0.36	-4.15***		
Glock	0.41	8.15***		
Intratec	-0.40	-4.18***		
Ruger	-0.42	-7.79***		
Smith&Wesson	-0.08	-1.71*		
Sig-Sauer	0	-0.09		
Taurus	-0.31	-6.10***		
AK-type			-0.25	-3.15***
Colt AR-15			0.14	1.68*
Ruger Mini-14			-0.08	-0.92
Distributor 1	-0.72	-16.38***	-0.35	-5.15***
Distributor 2	-0.15	-0.97	-0.83	-5.24***
Distributor 3	-0.16	-3.93***	0.19	2.69***
Distributor 4	-0.55	-5.72***	0.16	0.80
Distributor 5	-0.07	-1.79*	-0.18	-2.65***
Distributor 6	-0.53	-1.23	-0.12	-0.32
Distributor 7	-1.59	-3.70***	-0.10	-0.91
Distributor 8			0.14	0.70
Distributor 9	-0.91	-12.52***	-0.48	-4.00***
F statistic	58.76		21.22	
(p value)	<.0001		<.0001	
Adj. R-square	0.51		0.38	

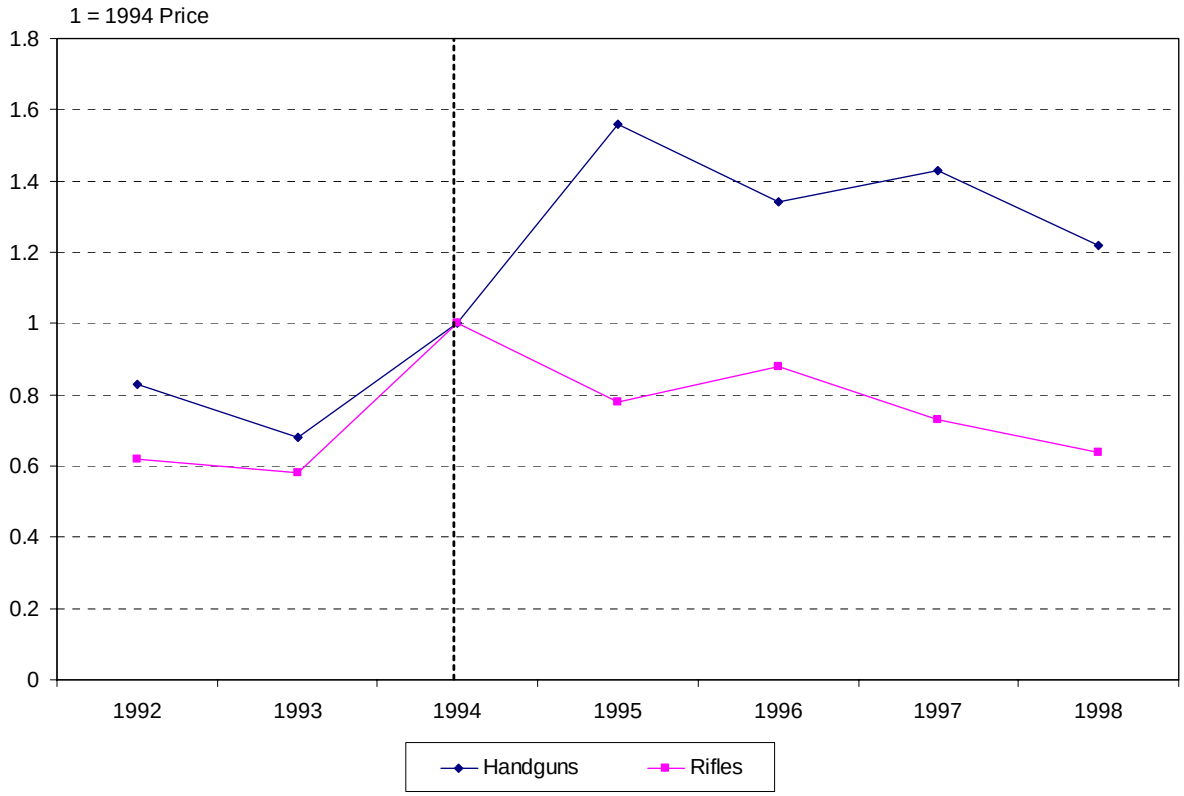
Year indicators are interpreted relative to 1994, and distributors are interpreted relative to distributor 10. Handgun makes are relative to Beretta and rifle models are relative to SKS.

* Statistically significant at p<=.10.

** Statistically significant at p<=.05.

*** Statistically significant at p<=.01.

Figure 7-1. Annual Price Trends for Large Capacity Magazines, 1992-1998



Based on 1,277 sampled ads for LCMs fitting models of 8 handgun makers and 674 sampled ads for LCMs fitting 4 rifle model groups.

7.1.2. Large Capacity Magazines for Rifles

We approximated trends in the prices of LCMs for rifles by modeling the prices of LCMs manufactured for AR-15, Mini-14, SKS,[68] and AK-type rifle models (including various non-banned AK-type models). As in the handgun LCM model, larger LCMs drew higher prices, and there were several significant model and distributor effects. AR-15 magazines tended to have the highest prices, and magazines for AK-type models had the lowest prices (Table 7-1).

Like their handgun counterparts, prices for rifle LCMs increased over 40% from 1993 to 1994, as the ban was debated and implemented (see Table 7-1 and Figure 7-1). However, prices declined over 20% in 1995. Following a rebound in 1996, prices moved downward again during 1997 and 1998. Prices in 1998 were over one third lower than the peak prices of 1994 and were comparable to pre-ban prices in 1992 and 1993.

[68] The SKS is a very popular imported rifle (there are Russian and Chinese versions) that was not covered by either the 1989 AR import ban or the 1994 AW ban. However, importation of SKS rifles from China was discontinued in 1994 due to trade restrictions.

7.2. Post-Ban Importation of Large Capacity Magazines

ATF does not collect (or at least does not publicize) statistics on production of LCMs. Therefore, we cannot clearly document pre-ban production trends. Nevertheless, it seems likely that gun and magazine manufacturers boosted their production of LCMs during the debate over the ban, just as AW makers increased production of AWs. Regardless, gun industry sources estimated that there were 25 million LCMs available as of 1995 (including aftermarket items for repairing magazines or converting them to LCMs) (Gun Tests, 1995, p. 30).

Moreover, the supply of LCMs continued to grow even after the ban due to importation of foreign LCMs that were manufactured prior to the ban (and thus grandfathered by the LCM legislation), according to ATF importation data.[69] As shown in Table 7-2, nearly 4.8 million LCMs were imported for commercial sale (as opposed to law enforcement uses) from 1994 through 2000, with the largest number (nearly 3.7 million) arriving in 1999.[70] During this period, furthermore, importers received permission to import a total of 47.2 million LCMs; consequently, an additional 42 million LCMs may have arrived after 2000 or still be on the way, based on just those approved through 2000.[71, 72]

To put this in perspective, gun owners in the U.S. possessed 25 million firearms that were equipped with magazines holding 10 or more rounds as of 1994 (Cook and Ludwig, 1996, p. 17). Therefore, the 4.7 million LCMs imported in the U.S. from 1994 through 2000 could conceivably replenish 19% of the LCMs that were owned at the time of the ban. The 47.2 million approved during this period could supply nearly 2 additional LCMs for all guns that were so equipped as of 1994.

7.3. Summary and Interpretations

Prices of LCMs for handguns rose significantly around the time of the ban and, despite some decline from their peak levels in 1995, remained significantly higher than pre-ban prices through at least 1998. The increase in LCM prices for rifles proved to be more temporary, with prices returning to roughly pre-ban levels by 1998.[73]

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[69] To import LCMs into the country, importers must certify that the magazines were made prior to the ban. (The law requires companies to mark post-ban LCMs with serial numbers.) As a practical matter, however, it is hard for U.S. authorities to know for certain whether imported LCMs were produced prior to the ban.

[70] The data do not distinguish between handgun and rifle magazines or the specific models for which the LCMs were made. But note that roughly two-thirds of the LCMs imported from 1994 through 2000 had capacities between 11 and 19 rounds, a range that covers almost all handgun LCMs as well as many rifle LCMs. It seems most likely that the remaining LCMs (those with capacities of 20 or more rounds) were primarily for rifles.

[71] The statistics in Table 7-2 do not include belt devices used for machine guns.

[72] A caveat to the number of approved LCMs is that importers may overstate the number of LCMs they have available to give themselves leeway to import additional LCMs, should they become available.

[73] A caveat is that we did not examine prices of smaller magazines, so the price trends described here may not have been entirely unique to LCMs. Yet it seems likely that these trends reflect the unique impact of the ban on the market for LCMs.

Table 7-2. Large Capacity Magazines Imported into the United States or Approved For Importation for Commercial Sale, 1994-2000

Year	Imported	Approved
1994	67,063	77,666
1995	3,776	2,066,228
1996	280,425	2,795,173
1997	99,972	1,889,773
1998	337,172	20,814,574
1999	3,663,619	13,291,593
2000	346,416	6,272,876
Total	*4,798,443*	*47,207,883*

Source: Firearms and Explosives Imports Branch, Bureau of Alcohol, Tobacco, Firearms, and Explosives. Counts do not include "links" (belt devices) or imports for law enforcement purposes.

The drop in rifle LCM prices between 1994 and 1998 may have due to the simultaneous importation of approximately 788,400 grandfathered LCMs, most of which appear to have been rifle magazines (based on the fact that nearly two-thirds had capacities over 19 rounds), as well as the availability of U.S. military surplus LCMs that fit rifles like the AR-15 and Mini-14. We can also speculate that demand for LCMs is not as great among rifle consumers, who are less likely to acquire their guns for defensive or criminal purposes.

The pre-ban supply of handgun LCMs may have been more constricted than the supply of rifle LCMs for at least a few years following the ban, based on prices from 1994 to 1998. Although there were an estimated 25 million LCMs available in the U.S. as of 1995, some major handgun manufacturers (including Ruger, Sig Sauer, and Glock) had or were close to running out of new LCMs by that time (Gun Tests, 1995, p. 30). Yet the frequency of advertisements for handgun LCMs during 1997 and 1998, as well as the drop in prices from their 1995 peak, suggests that the supply had not become particularly low. In 1998, for example, the selected distributors posted a combined total of 92 LCM ads per issue (some of which may have been for the same make, model, and capacity combinations) for just the handguns that we incorporated into our model.[74] Perhaps the

[74] Project staff found substantially more advertisements per issue for 1997 and 1998 than for earlier years. For the LCMs studied in the handgun analysis, staff recorded an average of 412 LCM advertisements per year (103 per issue) during 1997 and 1998. For 1992-1996, staff recorded an average of about 100 ads per year (25 per issue) for the same LCMs. A similar but smaller differential existed in the volume of ads for the LCMs used in the rifle analysis. The increase in LCM ads over time may reflect changes in supply and

demand for enhanced firepower among handgun consumers, who are more likely to acquire guns for crime or defense against crime, was also a factor (and perhaps a large one) putting a premium on handgun LCMs.

Although we might hypothesize that high prices depressed use of handguns with LCMs for at least a few years after the ban, a qualification to this prediction is that LCM use may be less sensitive to prices than is use of AWs because LCMs are much less expensive than the firearms they complement and therefore account for a smaller fraction of users' income (e.g., see Friedman, 1962). To illustrate, TEC-9 APs typically cost $260 at retail during 1992 and 1993, while LCMs for the TEC-9, ranging in capacity from 30 to 36 rounds, averaged $16.50 in *Shotgun News* advertisements (and probably $19 or less at retail) during the same period. So, for example, a doubling of both gun and LCM prices would likely have a much greater impact on purchases of TEC-9 pistols than purchases of LCMs for the TEC-9. Users willing and able to pay for a gun that accepts an LCM are most likely willing and able to pay for an LCM to use with the gun.

Moreover, the LCM supply was enhanced considerably by a surge in LCM imports that occurred after the period of our price analysis. During 1999 and 2000, an additional 4 million grandfathered LCMs were imported into the U.S., over two-thirds of which had capacities of 11-19 rounds, a range that covers almost all handgun LCMs (as well as many rifle LCMs). This may have driven prices down further after 1998.

In sum, market indicators yield conflicting signs on the availability of LCMs. It is perhaps too early to expect a reduction in crimes with LCMs, considering that tens of millions of grandfathered LCMs were available at the time of the ban, an additional 4.8 million – enough to replenish one-fifth of those owned by civilians – were imported from 1994 through 2000, and that the elasticity of demand for LCMs may be more limited than that of firearms. And if the additional 42 million foreign LCMs approved for importation become available, there may not be a reduction in crimes with LCMs anytime in the near future.

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demand for LCMs during the study period, as well as product shifts by distributors and perhaps changes in ad formats (e.g., ads during the early period may have been more likely to list magazines by handgun model without listing the exact capacity of each magazine, in which case coders would have been more likely to miss some LCMs during the early period). Because the data collection effort for the early period was part of a larger effort that involved coding prices in *Shotgun News* for LCMs and numerous banned and non-banned firearms, it is also possible that coders were more likely to miss LCM ads during that period due to random factors like fatigue or time constraints.

8. CRIMINAL USE OF LARGE CAPACITY MAGAZINES AFTER THE BAN

Assessing trends in criminal use of LCMs is difficult. There is no national data source on crime guns equipped with LCMs (ATF national tracing data do not include information about magazines recovered with traced firearms), and, based on our contacts with numerous police departments over the course of this study and the first AW study, it seems that even those police departments that maintain electronic databases on recovered firearms do not typically record the capacity of the magazines with which the guns are equipped.[75,76] Indeed, we were unable to acquire sufficient data to examine LCM use for the first AW study (Roth and Koper, 1997).

For the current study, we obtained four data sources with which to investigate trends in criminal use of LCMs. Three of the databases utilized in the AW analysis – those from Baltimore, Milwaukee, and Anchorage – contained information about the magazines recovered with the guns (see the descriptions of these databases in Chapter 6). Using updated versions of these databases, we examined all LCM recoveries in Baltimore from 1993 through 2003, recoveries of LCMs in Milwaukee murder cases from 1991 to 2001, and recoveries of LCMs linked to serious crimes in Anchorage (and other parts of Alaska) from 1992 through 2002.[77] In addition, we studied records of guns and magazines submitted to the Jefferson Regional Forensics Lab in Louisville, Kentucky from 1996 through 2000. This lab of the Kentucky State Police services law enforcement agencies throughout roughly half of Kentucky, but most guns submitted to the lab are from the Louisville area. Guns examined at the lab are most typically those associated with serious crimes such as murders, robberies, and assaults.

The LCM analyses and findings were not as uniform across locations as were those for AWs. Therefore, we discuss each site separately. As in the AW analysis, we emphasize changes in the percentage of guns equipped with LCMs to control for overall trends in gun crime and gun recoveries. Because gun crime was falling during the latter 1990s, we anticipated that the number of guns recovered with LCMs might decline independently of the ban's impact. (Hereafter, we refer to guns equipped with LCMs as LCM guns.)

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[75] For the pre-ban period, one can usually infer magazine capacity based on the firearm model. For post-ban recoveries, this is more problematic because gun models capable of accepting LCMs may have been equipped with grandfathered LCMs or with post-ban magazines designed to fit the same gun but holding fewer rounds.

[76] As for the AW analysis in Chapter 6, we utilize police data to examine trends in criminal use of LCMs. The reader is referred to the general discussion of police gun seizure data in Chapter 6.

[77] Findings presented in our 2002 interim report (Koper and Roth, 2002b) indicated that LCM use had not declined as of the late 1990s. Therefore, we sought to update the LCM analyses where possible for this version of the report.

8.1. Baltimore

In Baltimore, about 14% of guns recovered by police were LCM guns in 1993. This figure remained relatively stable for a few years after the ban but had dropped notably by 2002 and 2003 (Figure 8-1). For the entire post-ban period (1995-2003), recoveries of LCM guns were down 8% relative to those of guns with smaller magazines (Table 8-1, panel A), a change of borderline statistical significance. Focusing on the most recent years, however, LCM gun recoveries were 24% lower in 2002 and 2003 than during the year prior to the ban, a difference that was clearly significant (Table 8-1, panel B).[78,79,80] This change was attributable to a 36% drop in LCM handguns (Table 8-1, panel C). LCM rifles actually increased 36% as a share of crime guns, although they still accounted for no more than 3% in 2002 and 2003 (Table 8-1, panel D).[81]

Yet there was no decline in recoveries of LCM guns used in violent crimes (i.e., murders, shootings, robberies, and other assaults). After the ban, the percentage of violent crime guns with LCMs generally oscillated in a range consistent with the pre-ban level (14%) and hit peaks of roughly 16% to 17% in 1996 and 2003 (Figure 8-1).[82] Whether comparing the pre-ban period to the entire post-ban period (1995-2003) or the most recent years (2002-2003), there was no meaningful decline in LCM recoveries linked to violent crimes (Table 8-2, panels A and B).[83] Neither violent uses of LCM

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[78] Data on handgun magazines were also available for 1992. An auxiliary analysis of those data did not change the substantive inferences described in the text.

[79] The Maryland AP ban enacted in June 1994 also prohibited ammunition magazines holding over 20 rounds and did not permit additional sales or transfers of such magazines manufactured prior to the ban. This ban, as well as the Maryland and federal bans on AWs that account for many of the guns with magazines over 20 rounds, may have contributed to the downward trend in LCMs in Baltimore, but only 2% of the guns recovered in Baltimore from 1993 to 2000 were equipped with such magazines.

[80] All comparisons of 1993 to 2002-2003 in the Baltimore data are based on information from the months of January through November of each year. At the time we received these data, information was not yet available for December 2003, and preliminary analysis revealed that guns with LCMs were somewhat less likely to be recovered in December than in other months for years prior to 2003. Nevertheless, utilizing the December data for 1993 and 2002 did not change the substantive inferences. We did not remove December data from the comparisons of 1993 and the full post-ban period because those comparisons seemed less likely to be influenced by the absence of one month of data.

[81] This increase may have been due largely to a general increase in rifle seizures. LCM rifles actually dropped as a percentage of all rifle recoveries from 1993 to 2002-2003, suggesting that recoveries of LCM rifles were increasing less than recoveries of other rifles.

[82] For 1996, 45% of all records and 24% of those linked to violent crimes had missing data for magazine capacity (due to temporary changes in operational procedures in the Baltimore crime lab). For other years, missing data rates were no more than 6%. Based on those cases for which data were available, the share of guns with LCMs in 1996 was comparable to that in other years, particularly when examining all gun recoveries. At any rate, the analyses focusing on 1993, 2002, and 2003 reinforce the findings of those that include the 1996 data.

[83] The ammunition capacity code in the Baltimore data usually reflected the full capacity of the magazine and weapon, but sometimes reflected the capacity of the magazine only. (For instance, a semiautomatic with a 10-round magazine and the ability to accept one additional round in the chamber might have been coded as having a capacity of 10 or 11.) Informal assessment suggested that capacity was more likely to reflect the exact capacity of the magazine in the early years of the database and more likely to reflect the full capacity of the gun and magazine in later years. For the main runs presented in the text and tables, guns were counted as having LCMs if the coded capacity was greater than 11 rounds. This ensured that LCMs were not overestimated, but it potentially understated LCM prevalence, particularly for the earlier

handguns or LCM rifles had declined appreciably by 2002-2003 (Table 8-2, panels C and D). Hence, the general decline in LCM recoveries may reflect differences in the availability and use of LCMs among less serious offenders, changes in police practices,[84] or other factors.

Figure 8-1. Police Recoveries of Guns Equipped With Large Capacity Magazines in Baltimore, 1993-2003

years. However, coding the guns as LCM weapons based on a threshold of 10 (i.e., a coded capacity over 10 rounds) in 1993 and a threshold of 11 (i.e., a coded capacity over 11 rounds) for 2002-2003 did not change the inferences of the violent crime analysis. Further, this coding increased the pre-ban prevalence of LCMs by very little (about 4% in relative terms).

[84] During the late 1990s, for example, Baltimore police put greater emphasis on detecting illegal gun carrying (this statement is based on prior research and interviews the author has done in Baltimore as well as the discussion in Center to Prevent Handgun Violence, 1998). One can hypothesize that this effort reduced the fraction of recovered guns with LCMs because illegal gun carriers are probably more likely to carry smaller, more concealable handguns that are less likely to have LCMs.

Table 8-1. Trends in All Police Recoveries of Firearms Equipped With Large Capacity Magazines, Baltimore, 1993-2003

	Pre-Ban Period	Post-Ban Period	Change
A. All LCM Guns	Jan.-Dec. 1993	Jan. 1995-Nov. 2003	
Total	473	3703	
Annual Mean	473	445.86 [a]	-6%
LCM Guns as % of All Guns	13.51%	12.38%	-8%*
B. All LCM Guns	Jan.-Nov. 1993	Jan.-Nov. 2002-2003	
Total	430	626	
Annual Mean	430	313	-27%
LCM Guns as % of All Guns	13.47%	10.3%	-24%***
C. LCM Handguns	Jan.-Nov. 1993	Jan.-Nov. 2002-2003	
Total	359	440	
Annual Mean	359	220	-39%
LCM Handguns as % of All Guns	11.25%	7.24%	-36%***
D. LCM Rifles	Jan.-Nov. 1993	Jan.-Nov. 2002-2003	
LCM Rifles	71	183	
Annual Mean	71	91.5	29%
LCM Rifles as % of All Guns	2.22%	3.01%	36%**

a. Annual average calculated without 1996 and 2003 (to correct for missing months or missing magazine data).
* Chi-square p level < .10 (changes in percentages of guns equipped with LCMs were tested for statistical significance)
** Chi-square p level <.05 (changes in percentages of guns equipped with LCMs were tested for statistical significance)
** Chi-square p level < .01 (changes in percentages of guns equipped with LCMs were tested for statistical significance)

Table 8-2. Trends in Police Recoveries of Firearms Equipped With Large Capacity Magazines in Violent Crime Cases, Baltimore, 1993-2003

	Pre-Ban Period	Post-Ban Period	Change [a]
A. All LCM Guns	Jan.-Dec. 1993	Jan. 1995-Nov. 2003	
Total	87	711	
Annual Mean	87	81.86 [b]	-6%
LCM Guns as % of All Guns	14.01%	14.44%	3%
B. All LCM Guns	Jan.-Nov. 1993	Jan.-Nov. 2002-2003	
Total	79	104	
Annual Mean	79	52	-34%
LCM Guns as % of All Guns	13.96%	13.65%	-2%
C. LCM Handguns	Jan.-Nov. 1993	Jan.-Nov. 2002-2003	
Total	62	81	
Annual Mean	62	40.5	-35%
LCM Handguns as % of All Guns	10.95%	10.63%	-3%
D. LCM Rifles	Jan.-Nov. 1993	Jan.-Nov. 2002-2003	
LCM Rifles	17	23	
Annual Mean	17	11.5	-32%
LCM Rifles as % of All Guns	3%	3.02%	1%

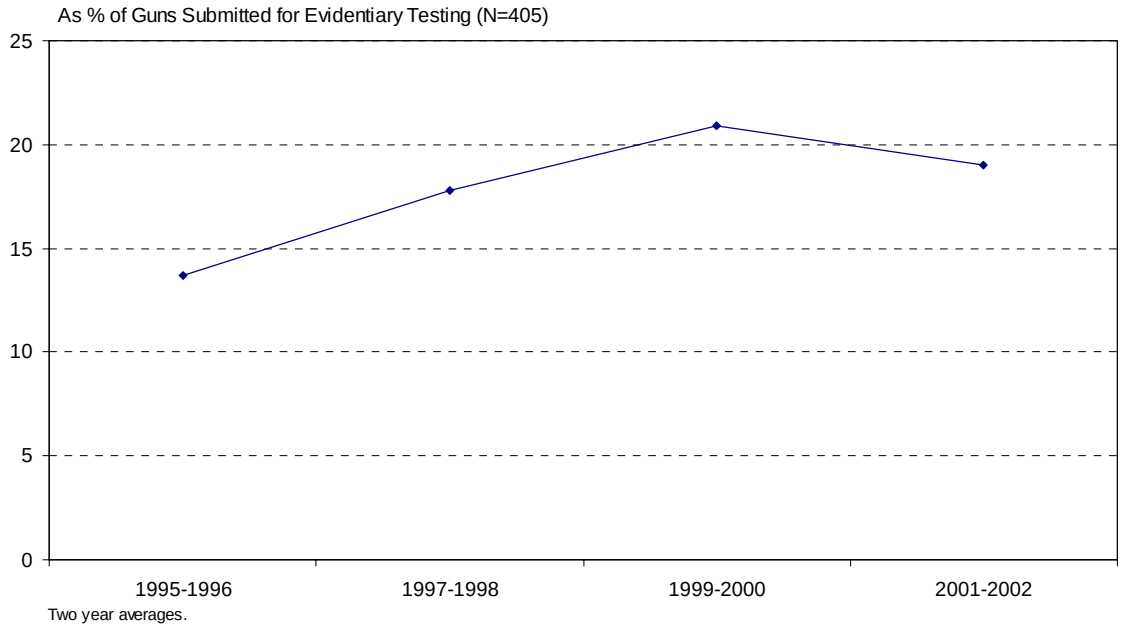
a. Changes in the percentages of guns with LCMs were statistically insignificant in chi-square tests.
b. Annual average calculated without 1996 and 2003 (to correct for missing months or missing magazine data).

8.2. Anchorage

In the Alaska database, magazine capacity was recorded only for guns recovered during the post-ban years, 1995 through 2002. However, we estimated pre-ban use of LCM handguns by identifying handgun models inspected during 1992 and 1993 that were manufactured with LCMs prior to the ban.[85] This permitted an assessment of pre-post changes in the use of LCM handguns.

As shown in Figure 8-2 (also see Table 8-3, panel A), LCM guns rose from 14.5% of crime guns in 1995-1996 to 24% in 2000-2001 (we present two-year averages because the sample are relatively small, particularly for the most recent years) and averaged about 20% for the entire post-ban period. LCM handguns drove much of this trend, but LCM rifles also increased from about 3% of crime guns in 1995-96 to 11% in 2000-2001.

Figure 8-2. Police Recoveries of Guns Equipped With Large Capacity Magazines in Anchorage (Alaska), 1995-2002



[85] To make these determinations, we consulted gun catalogs such as the *Blue Book of Gun Values* and *Guns Illustrated.*

Table 8-3. Trends in Police Recoveries of Firearms Equipped With Large Capacity Magazines in Violent Crime Cases, Anchorage (Alaska), 1992-2002 [a]

	Pre-Ban Period	Post-Ban Period	Change [b]
A. All LCM Guns	N/A	Jan. 1995-Dec. 2002	
Total		80	
Annual Mean		10	N/A
LCM Guns as % of All Guns		19.75%	N/A
B. LCM Handguns	Jan. 1992-Dec. 1993	Jan. 1995-Dec. 2002	
Total	17	57	
Annual Mean	8.5	7.13	-16%
LCM Handguns as % All Handguns	26.15%	22.35%	-15%
C. LCM Handguns	Jan. 1992-Dec. 1993	Jan. 2001-Dec. 2002	
Total	17	10	
Annual Mean	8.5	5	-41%
LCM Handguns as % of All Handguns	26.15%	19.23%	-26%

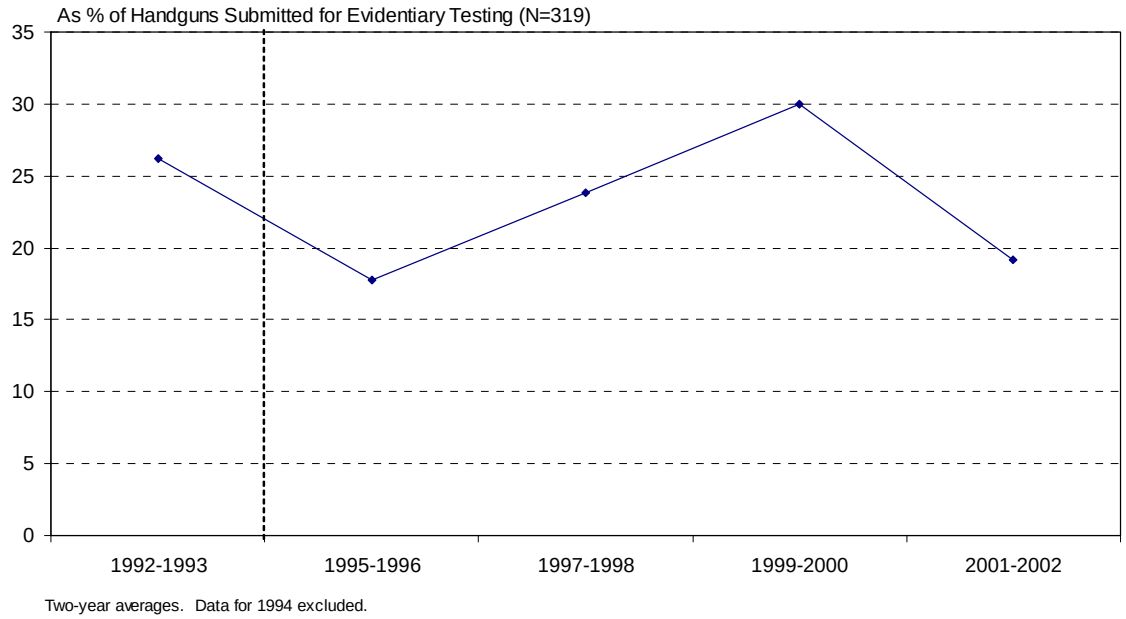
a. Based on guns submitted to State Police for evidentiary testing.
b. Changes in the percentages of guns equipped with LCMs were statistically insignificant in chi-square tests.

Investigation of pre-post changes for handguns revealed an inconsistent pattern (Figure 8-3). LCM handguns dropped initially after the ban, declining from 26% of handguns in 1992-1993 to 18% in 1995-1996. However, they rebounded after 1996, reaching a peak of 30% of handguns in 1999-2000 before declining to 19% in 2001-2002.

For the entire post-ban period, the share of handguns with LCMs was about 15% lower than in the pre-ban period (Table 8-3, panel B). By the two most recent post-ban years (2001-2002), LCM use had dropped 26% from the pre-ban years (Table 8-3, panel C). These changes were not statistically significant, but the samples of LCM handguns were rather small for rigorous statistical testing. Even so, it seems premature to conclude

that there has been a lasting reduction in LCM use in Alaska. LCM use in 2001-2002 was somewhat higher than that immediately following the ban in 1995-1996, after which there was a substantial rebound. Considering the inconsistency of post-ban patterns, further follow-up seems warranted before making definitive conclusions about LCM use in Alaska.

Figure 8-3. Police Recoveries of Handguns Equipped With Large Capacity Magazines in Anchorage (Alaska), 1992-2002



8.3. Milwaukee

LCM guns accounted for 21% of guns recovered in Milwaukee murder investigations from 1991 to 1993 (Table 8-4, panel A). Following the ban, this figure rose until reaching a plateau of over 36% in 1997 and 1998 (Figure 8-4). On average, the share of guns with LCMs grew 55% from 1991-1993 to 1995-1998, a trend that was driven by LCM handguns (Table 8-4, panels A and B).[86] LCM rifles held steady at between 4% and 5% of the guns (Table 8-4, panel C).

We also analyzed a preliminary database on 48 guns used in murders during 2000 and 2001 (unlike the 1991-1998 database, this database did not include information on other guns recovered during the murder investigations). About 11% of these guns were LCM guns, as compared to 19% of guns used in murders from 1991 to 1993 (analyses not shown). However, nearly a quarter of the 2000-2001 records were missing information on magazine capacity.[87] Examination of the types and models of guns with

[86] LCM guns also increased as share of guns that were used in the murders (the full sample results discussed in the text include all guns recovered during the investigations).
[87] Magazine capacity was missing for less than 4% of the records in earlier years.

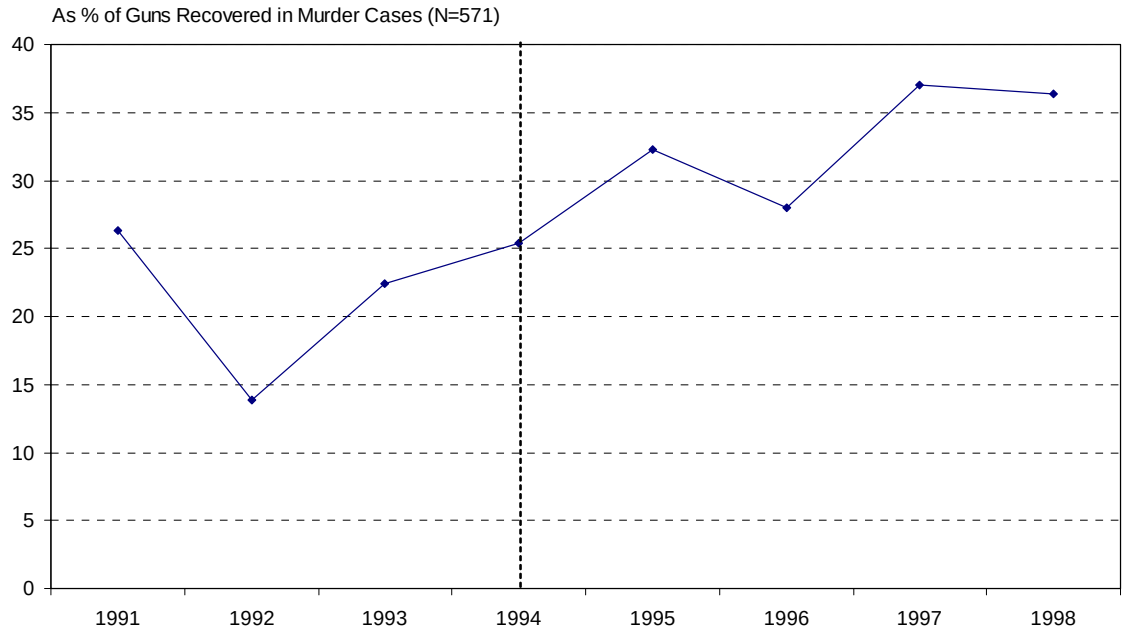
unidentified magazines suggested that as many as 17% of guns used in murders during 2000 and 2001 may have been LCM guns (based on all those that either had LCMs, were models sold with LCMs prior to the ban, or were unidentified semiautomatics). While this still suggests a drop in LCM use from the peak levels of the late 1990s (26% of guns used in murders from 1995 to 1998 had LCMs), it is not clear that LCM use has declined significantly below pre-ban levels.

Table 8-4. Trends in Police Recoveries of Firearms Equipped With Large Capacity Magazines in Murder Cases, Milwaukee County, 1991-1998

	Pre-Ban Period	Post-Ban Period	Change
A. All LCM Guns	Jan. 1991-Dec. 1993	Jan. 1995-Dec. 1998	
Total	51	83	
Annual Mean	17	20.75	22%
LCM Guns as % of All Guns	20.9%	32.42%	55%*
B. LCM Handguns	Jan. 1991-Dec. 1993	Jan. 1995-Dec. 1998	
Total	40	71	
Annual Mean	13.33	17.75	33%
LCM Handguns as % of All Guns	16.39%	27.73%	69%*
C. LCM Rifles	Jan. 1991-Dec. 1993	Jan. 1995-Dec. 1998	
Total	11	12	
Annual Mean	3.67	3	-18%
LCM Rifles as % of All Guns	4.51%	4.69%	4%

* Chi-square p level < .01 (changes in percentages of guns equipped with LCMs were tested for statistical significance)

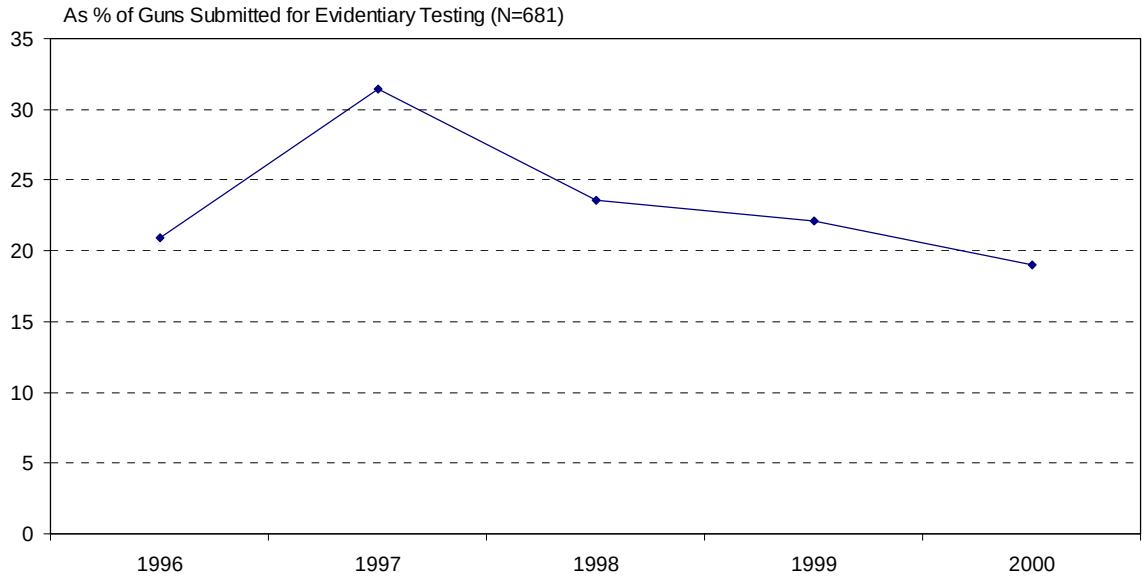
Figure 8-4. Recoveries of Guns Equipped With Large Capacity Magazines in Milwaukee County Murder Cases, 1991-1998



8.4. Louisville

The Louisville LCM data are all post-ban (1996-2000), so we cannot make pre-post comparisons. Nonetheless, the share of crime guns with LCMs in Louisville (24%) was within the range of that observed in the other cities during this period. And similar to post-ban trends in the other sites, LCM recoveries peaked in 1997 before leveling off and remaining steady through the year 2000 (Figure 8-5). LCM rifles dropped 21% as a share of crime guns between 1996 and 2000 (analyses not shown), but there were few in the database, and they never accounted for more than 6.2% of guns in any year.

Figure 8-5. Police Recoveries of Guns Equipped With Large Capacity Magazines in Louisville (Kentucky), 1996-2000



Year 2000 data are not for the full year.

8.5. Summary

Despite a doubling of handgun LCM prices between 1993 and 1995 and a 40% increase in rifle LCM prices from 1993 to 1994, criminal use of LCMs was rising or steady through at least the latter 1990s, based on police recovery data from four jurisdictions studied in this chapter. These findings are also consistent with an earlier study finding no decline in seizures of LCM guns from juveniles in Washington, DC in the year after the ban (Koper, 2001).[88] Post-2000 data, though more limited and inconsistent, suggest that LCM use may be dropping from peak levels of the late 1990s but provide no definitive evidence of a drop below pre-ban levels.[89] These trends have been driven primarily by LCM handguns, which are used in crime roughly three times as

[88] From 1991 to 1993, 16.4% of guns recovered from juveniles in Washington, DC had LCMs (14.2% had LCMs in 1993). In 1995, this percentage increased to 17.1%. We did not present these findings in this chapter because the data were limited to guns recovered from juveniles, the post-ban data series was very short, and the gun markets supplying DC and Baltimore are likely to have much overlap (Maryland is a leading supplier of guns to DC – see ATF, 1997; 1999).

[89] We reran selected key analyses with the Baltimore, Milwaukee, and Louisville data after excluding .22 caliber guns, some of which could have been equipped with attached tubular magazines that are exempted from the LCM ban, and obtained results consistent with those reported in the text. It was possible to identify these exempted magazines in the Anchorage data. When they were removed from Anchorage's LCM count, the general pattern in use of banned LCMs was similar to that presented in the main 1995-2002 analysis: guns with banned LCMs rose, reaching a peak of 21% of crime guns in 1999-2000, before declining slightly to 19% in 2001-2002.

often as LCM rifles. Nonetheless, there has been no consistent reduction in the use of LCM rifles either.

The observed patterns are likely due to several factors: a hangover from pre-ban growth in the production and marketing of LCM guns (Cook and Ludwig, 1997, pp. 5-6; Wintemute, 1996);[90] the low cost of LCMs relative to the firearms they complement, which seems to make LCM use less sensitive to prices than is firearm use;[91] the utility that gun users, particularly handgun users, attach to LCMs; a plentiful supply of grandfathered LCMs, likely enhanced by a pre-ban surge in production (though this has not been documented) and the importation of millions of foreign LCMs since the ban;[92] thefts of LCM firearms (see Roth and Koper, 1997, Chapter 4); or some combination of these factors.[93] However, it is worth noting that our analysis did not reveal an upswing in use of LCM guns following the surge of LCM importation in 1999 (see the previous chapter). It remains to be seen whether recent imports will have a demonstrable effect on patterns of LCM use.

Finally, we must be cautious in generalizing these results to the nation because they are based on a small number of non-randomly selected jurisdictions. Nonetheless, the consistent failure to find clear evidence of a pre-post drop in LCM use across these geographically diverse locations strengthens the inference that the findings are indicative of a national pattern.

[90] To illustrate this trend, 38% of handguns acquired by gun owners during 1993 and 1994 were equipped with magazines holding 10 or more rounds, whereas only 14% of handguns acquired before 1993 were so equipped (Cook and Ludwig, 1997, pp. 5-6).

[91] Although elevated post-ban prices did not suppress use of LCMs, a more subtle point is that LCM use rose in most of these locations between 1995 and 1998, as LCM prices were falling from their peak levels of 1994-1995. Therefore, LCM use may have some sensitivity to price trends.

[92] However, we do not have the necessary data to determine if LCMs used in crime after the ban were acquired before or after the ban.

[93] In light of these considerations, it is conceivable that the ban slowed the rate of growth in LCM use, accelerated it temporarily (due to a pre-ban production boom), or had no effect. We do not have the data necessary to examine this issue rigorously. Moreover, the issue might be regarded as somewhat superfluous; the more critical point would seem to be that nearly a decade after the ban, LCM use has still not declined demonstrably below pre-ban levels.

9. THE CONSEQUENCES OF CRIMES WITH ASSAULT WEAPONS AND LARGE CAPACITY MAGAZINES

One of the primary considerations motivating passage of the ban on AWs and LCMs was a concern over the perceived dangerousness of these guns and magazines. In principal, semiautomatic weapons with LCMs enable offenders to fire high numbers of shots rapidly, thereby potentially increasing both the number of person wounded per gunfire incident (including both intended targets and innocent bystanders) and the number of gunshot victims suffering multiple wounds, both of which would increase deaths and injuries from gun violence. Ban advocates also argued that the banned AWs possessed additional features conducive to criminal applications.

The findings of the previous chapters suggest that it is premature to make definitive assessments of the ban's impact on gun violence. Although criminal use of AWs has declined since the ban, this reduction was offset through at least the late 1990s by steady or rising use of other guns equipped with LCMs. As argued previously, the LCM ban has greater potential for reducing gun deaths and injuries than does the AW ban. Guns with LCMs – of which AWs are only a subset – were used in up to 25% of gun crimes before the ban, whereas AWs were used in no more than 8% (Chapter 3). Furthermore, an LCM is arguably the most important feature of an AW. Hence, use of guns with LCMs is probably more consequential than use of guns with other military-style features, such as flash hiders, folding rifle stocks, threaded barrels for attaching a silencers, and so on.[94]

This is not to say that reducing use of AWs will have no effect on gun crime; a decline in the use of AWs does imply fewer crimes with guns having particularly large magazines (20 or more rounds) and other military-style features that could facilitate some crimes. However, it seems that any such effects would be outweighed, or at least

[94] While it is conceivable that changing features of AWs other than their magazines might prevent some gunshot victimizations, available data provide little if any empirical basis for judging the likely size of such effects. Speculatively, some of the most beneficial weapon redesigns may be the removal of folding stocks and pistol grips from rifles. It is plausible that some offenders who cannot obtain rifles with folding stocks (which make the guns more concealable) might switch to handguns, which are more concealable but generally cause less severe wounds (e.g. see DiMaio, 1985). However, such substitution patterns cannot be predicted with certainty. Police gun databases rarely have information sufficiently detailed to make assessments of changes over time in the use of weapons with specific features like folding stocks. Based on informal assessments, there was no consistent pattern in post-ban use of rifles (as a share of crime guns) in the local databases examined in the prior chapters (also see the specific comments on LCM rifles in the previous chapters).

Pistol grips enhance the ability of shooters to maintain control of a rifle during rapid, "spray and pray" firing (e.g., see Violence Policy Center, 2003). (Heat shrouds and forward handgrips on APs serve the same function.) While this feature may prove useful in military contexts (e.g., firefights among groups at 100 meters or less – see data of the U.S. Army's Operations Research Office as cited in Violence Policy Center, 2003), it is unknown whether civilian attacks with semiautomatic rifles having pistol grips claim more victims per attack than do those with other semiautomatic rifles. At any rate, most post-ban AR-type rifles still have pistol grips. Further, the ban does not count a stock thumbhole grip, which serves the same function as a pistol grip (e.g., see the illustration of LCMM rifles in Chapter 2), as an AR feature.

obscured, by the wider effects of LCM use, which themselves are likely to be small at best, as we argue below.[95]

Because offenders can substitute non-banned guns and small magazines for banned AWs and LCMs, there is not a clear rationale for expecting the ban to reduce assaults and robberies with guns.[96] But by forcing AW and LCM offenders to substitute non-AWs with small magazines, the ban might reduce the number of shots fired per gun attack, thereby reducing both victims shot per gunfire incident and gunshot victims sustaining multiple wounds. In the following sections, we consider the evidence linking high-capacity semiautomatics and AWs to gun violence and briefly examine recent trends in lethal and injurious gun violence.

9.1. The Spread of Semiautomatic Weaponry and Trends in Lethal and Injurious Gun Violence Prior to the Ban

Nationally, semiautomatic handguns grew from 28% of handgun production in 1973 to 80% in 1993 (Zawitz, 1995, p. 3). Most of this growth occurred from the late 1980s onward, during which time the gun industry also increased marketing and production of semiautomatics with LCMs (Wintemute, 1996). Likewise, semiautomatics grew as a percentage of crime guns (Koper, 1995; 1997), implying an increase in the average firing rate and ammunition capacity of guns used in crime.[97]

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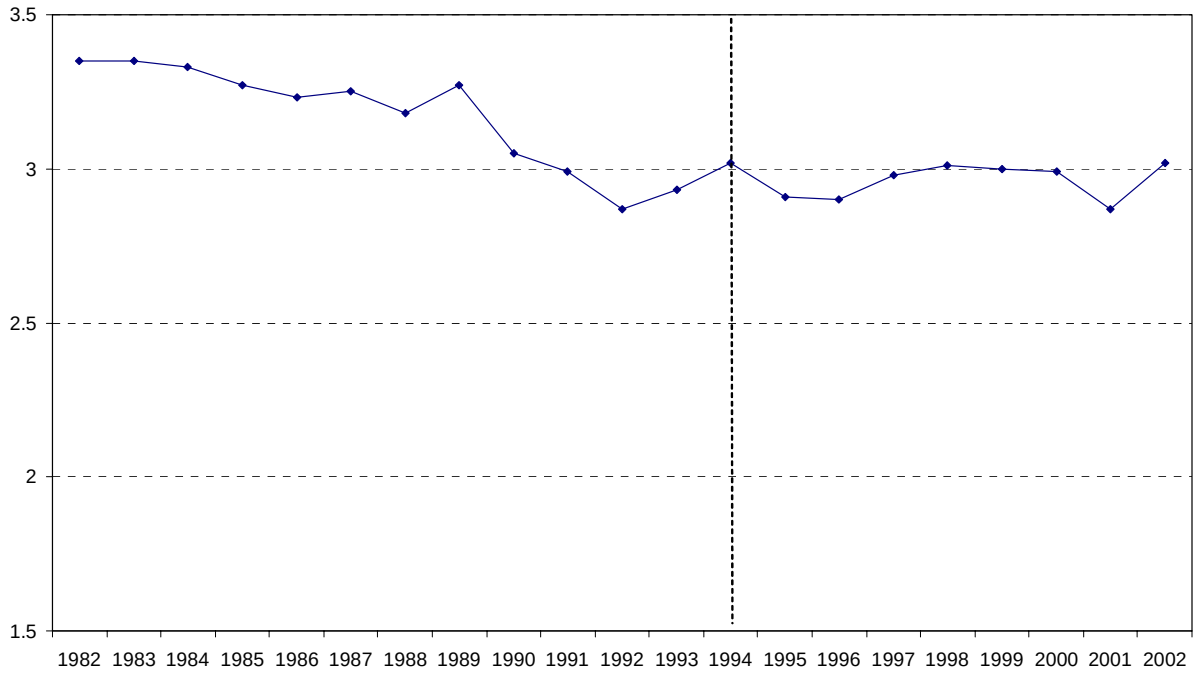
[95] On a related note, a few studies suggest that state-level AW bans have not reduced crime (Koper and Roth, 2001a; Lott, 2003). This could be construed as evidence that the federal AW ban will not reduce gunshot victimizations without reducing LCM use because the state bans tested in those studies, as written at the time, either lacked LCM bans or had LCM provisions that were less restrictive than that of the federal ban. (New Jersey's 1990 AW ban prohibited magazines holding more than 15 rounds. AP bans passed by Maryland and Hawaii prohibited magazines holding more than 20 rounds and pistol magazines holding more than 10 rounds, respectively, but these provisions did not take effect until just a few months prior to the federal ban.) However, it is hard to draw definitive conclusions from these studies for a number of reasons, perhaps the most salient of which are the following: there is little evidence on how state AW bans affect the availability and use of AWs (the impact of these laws is likely undermined to some degree by the influx of AWs from other states, a problem that was probably more pronounced prior to the federal ban when the state laws were most relevant); studies have not always examined the effects of these laws on gun homicides and shootings, the crimes that are arguably most likely to be affected by AW bans (see discussion in the main text); and the state AW bans that were passed prior to the federal ban (those in California, New Jersey, Hawaii, Connecticut, and Maryland) were in effect for only three months to five years (two years or less in most cases) before the imposition of the federal ban, after which they became largely redundant with the federal legislation and their effects more difficult to predict and estimate.

[96] One might hypothesize that the firepower provided by AWs and other semiautomatics with LCMs emboldens some offenders to engage in aggressive behaviors that prompt more shooting incidents. On the other hand, these weapons might also prevent some acts of violence by intimidating adversaries, thus discouraging attacks or resistance. We suspect that firepower does influence perceptions, considering that many police departments have upgraded their weaponry in recent years – often adopting semiautomatics with LCMs – because their officers felt outgunned by offenders. However, hypotheses about gun types and offender behavior are very speculative, and, pending additional research on such issues, it seems prudent to focus on indicators with stronger theoretical and empirical foundations.

[97] Revolvers, the most common type of non-semiautomatic handgun, typically hold only 5 or 6 rounds (and sometimes up to 9). Semiautomatic pistols, in contrast, hold ammunition in detachable magazines that, prior to the ban, typically held 5 to 17 bullets and sometimes upwards of 30 (Murtz et al., 1994).

The impact of this trend is debatable. Although the gun homicide rate rose considerably during the late 1980s and early 1990s (Bureau of Justice Statistics, 1994, p. 13), the percentage of violent gun crimes resulting in death was declining (see Figure 9-1 and the related discussion in section 9.3). Similarly, the percentage of victims killed or wounded in handgun discharge incidents declined from 27% during the 1979-1987 period to 25% for the 1987-1992 period (calculated from Rand, 1990, p. 5; 1994, p. 2) as semiautomatics were becoming more common crime weapons.[98] On the other hand, an increasing percentage of gunshot victims died from 1992 to 1995 according to hospital data (Cherry et al., 1998), a trend that could have been caused in part by a higher number of gunshot victims with multiple wounds (also see McGonigal et al., 1993). Most notably, the case fatality rate for assaultive gunshot cases involving 15 to 24-year-old males rose from 15.9% in late 1993 to 17.5% in early 1995 (p. 56).

Figure 9-1. Percentage of Violent Gun Crimes Resulting in Death (National), 1982-2002



Based on gun homicides, gun robberies, and gun assaults reported in the Uniform Crime Reports and Supplemental Homicide Reports.

[98] A related point is that there was a general upward trend in the average number of shots fired by offenders in gunfights with New York City police from the late 1980s through 1992 (calculated from Goehl, 1993, p. 51). However, the average was no higher during this time than during many years of the early 1980s and 1970s.

Some researchers have inferred links between the growing use of semiautomatics in crime and the rise of both gun homicides and bystander shootings in a number of cities during the late 1980s and early 1990s (Block and Block, 1993; McGonigal et al., 1993; Sherman et al., 1989; Webster et al., 1992). A study in Washington, DC, for example, reported increases in wounds per gunshot victim and gunshot patient mortality during the 1980s that coincided with a reported increase in the percentage of crime guns that were semiautomatics (Webster et al., 1992).

Nevertheless, changes in offender behavior, coupled with other changes in crime guns (e.g., growing use of large caliber handguns – see Caruso et al., 1999; Koper, 1995; 1997; Wintemute, 1996), may have been key factors driving such trends. Washington, DC, for example, was experiencing an exploding crack epidemic at the time of the aforementioned study, and this may have raised the percentage of gun attacks in which offenders had a clear intention to injure or kill their victims. Moreover, studies that attempted to make more explicit links between the use of semiautomatic firearms and trends in lethal gun violence via time series analysis failed to produce convincing evidence of such links (Koper, 1995; 1997). However, none of the preceding research related specific trends in the use of AWs or LCMs to trends in lethal gun violence.

9.2. Shots Fired in Gun Attacks and the Effects of Weaponry on Attack Outcomes

The evidence most directly relevant to the potential of the AW-LCM ban to reduce gun deaths and injuries comes from studies examining shots fired in gun attacks and/or the outcomes of attacks involving different types of guns. Unfortunately, such evidence is very sparse.

As a general point, the faster firing rate and larger ammunition capacities of semiautomatics, especially those equipped with LCMs, have the potential to affect the outcomes of many gun attacks because gun offenders are not particularly good shooters. Offenders wounded their victims in no more than 29% of gunfire incidents according to national, pre-ban estimates (computed from Rand, 1994, p. 2; also see estimates presented later in this chapter). Similarly, a study of handgun assaults in one city revealed a 31% hit rate per shot, based on the sum totals of all shots fired and wounds inflicted (Reedy and Koper, 2003, p. 154). Other studies have yielded hit rates per shot ranging from 8% in gunfights with police (Goehl, 1993, p. 8) to 50% in mass murders (Kleck, 1997, p. 144). Even police officers, who are presumably certified and regularly re-certified as proficient marksman and who are almost certainly better shooters than are average gun offenders, hit their targets with only 22% to 39% of their shots (Kleck, 1991, p. 163; Goehl, 1993). Therefore, the ability to deliver more shots rapidly should raise the likelihood that offenders hit their targets, not to mention innocent bystanders.[99]

[99] However, some argue that this capability is offset to some degree by the effects of recoil on shooter aim, the limited number of shots fired in most criminal attacks (see below), and the fact that criminals using non-semiautomatics or semiautomatics with small magazines usually have the time and ability to deliver multiple shots if desired (Kleck, 1991, pp. 78-79).

A few studies have compared attacks with semiautomatics, sometimes specifically those with LCMs (including AWs), to other gun assaults in terms of shots fired, persons hit, and wounds inflicted (see Tables 9-1 and 9-2). The most comprehensive of these studies examined police reports of attacks with semiautomatic pistols and revolvers in Jersey City, New Jersey from 1992 through 1996 (Reedy and Koper, 2003), finding that use of pistols resulted in more shots fired and higher numbers of gunshot victims (Table 9-1), though not more gunshot wounds per victim (Table 9-2).[100] Results implied there would have been 9.4% fewer gunshot victims overall had semiautomatics not been used in any of the attacks. Similarly, studies of gun murders in Philadelphia (see McGonigal et al., 1993 in Table 9-1) and a number of smaller cities in Pennsylvania, Ohio, and Iowa (see Richmond et al., 2003 in Table 9-2) found that attacks with semiautomatics resulted in more shots fired and gunshot wounds per victim. An exception is that the differential in shots fired between pistol and revolver cases in Philadelphia during 1990 did not exist for cases that occurred in 1985, when semiautomatics and revolvers had been fired an average of 1.6 and 1.9 times, respectively. It is not clear whether the increase in shots fired for pistol cases from 1985 to 1990 was due to changes in offender behavior, changes in the design or quality of pistols (especially an increase in the use of models with LCMs – see Wintemute, 1996), the larger sample for 1990, or other factors.

[100] But unlike other studies that have examined wounds per victim (see Table 9-2), this study relied on police reports of wounds inflicted rather than medical reports, which are likely to be more accurate.

Table 9-1. Shots Fired and Victims Hit in Gunfire Attacks By Type of Gun and Magazine

Data Source	Measure	Outcome
Gun attacks with semiautomatic pistols and revolvers, Jersey City, 1992-1996 [a]	Shots Fired	Avg. = 3.2 – 3.7 (n=165 pistol cases) * Avg. = 2.3 – 2.6 (n=71 revolver cases) *
Gun homicides with semiautomatic pistols and revolvers, Philadelphia, 1985 and 1990 [b]	Shots Fired	Avg. = 1.6 (n=21 pistol cases, 1985) Avg. = 1.9 (n=57 revolver cases, 1985) Avg. = 2.7 (n=95 pistol cases, 1990) Avg. = 2.1 (n=108 revolver cases, 1990)
Gun attacks with semiautomatic pistols and revolvers, Jersey City, 1992-1996 [a]	Victims Hit	Avg. = 1.15 (n=95 pistol cases) * Avg. = 1.0 (n=40 revolver cases) *
Mass shootings with AWs, semiautomatics having LCMs, or other guns, 6+ dead or 12+ shot, United States, 1984-1993 [c]	Victims Hit	Avg. = 29 (n=6 AW/LCM cases) Avg. = 13 (n=9 non-AW/LCM cases)
Self-reported gunfire attacks by state prisoners with AWs, other semiautomatics, and non-semiautomatic firearms, United States, 1997 or earlier [d]	% of Attacks With Victims Hit	19.5% (n=72 AW or machine gun cases) 22.3% (n=419 non-AW, semiautomatic cases) 23.3% (n=608 non-AW, non-semiautomatic cases)

a. Reedy and Koper (2003)
b. McGonigal et al. (1993)
c. Figures calculated by Koper and Roth (2001a) based on data presented by Kleck (1997, p. 144)
d. Calculated from Harlow (2001, p. 11). (Sample sizes are based on unpublished information provided by the author of the survey report.)
* Pistol/revolver differences statistically significant at $p<.05$ (only Reedy and Koper [2003] and Harlow [2001] tested for statistically significant differences). The shots fired ranges in Reedy and Koper are based on minimum and maximum estimates.

Table 9-2. Gunshot Wounds Per Victim By Type of Gun and Magazine

Data Source	Measure	Outcome
Gun attacks with semiautomatic pistols and revolvers, Jersey City, 1992-1996 [a]	Gunshot Wounds	Avg. = 1.4 (n=107 pistol victims) Avg. = 1.5 (n=40 revolver victims)
Gun homicides with semiautomatic pistols and revolvers, Iowa City (IA), Youngstown (OH), and Bethlehem (PA), 1994-1998 [b]	Gunshot Wounds	Avg. = 4.5 total (n=212 pistol victims)* Avg. = 2.9 entry Avg. = 2.0 total (n=63 revolver victims)* Avg. = 1.5 entry
Gun homicides with assault weapons (AWs), guns having large capacity magazines (LCMs), and other firearms, Milwaukee, 1992-1995 [c]	Gunshot Wounds	Avg. = 3.23 (n=30 LCM victims) ** Avg. = 3.14 (n=7 AW victims) Avg. = 2.08 (n=102 non-AW/LCM victims)**

a. Reedy and Koper (2003)
b. Richmond et al. (2003)
c. Roth and Koper (1997, Chapter 6)
* Pistol/revolver differences statistically significant at $p<.01$.
** The basic comparison between LCM victims and non-AW/LCM victims was moderately significant ($p<.10$) with a one-tailed test. Regression results (with a slightly modified sample) revealed a difference significant at $p=.05$ (two-tailed test). Note that the non-LCM group included a few cases involving non-banned LCMs (.22 caliber attached tubular devices).

Also, a national survey of state prisoners found that, contrary to expectations, offenders who reported firing on victims with AWs and other semiautomatics were no more likely to report having killed or injured victims than were other gun offenders who reported firing on victims (Table 9-1). However, the measurement of guns used and attack outcomes were arguably less precise in this study, which was based on offender self-reports, than in other studies utilizing police and medical reports.[101]

Attacks with AWs or other guns with LCMs may be particularly lethal and injurious, based on very limited evidence. In mass shooting incidents (defined as those in which at least 6 persons were killed or at least 12 were wounded) that occurred during the decade preceding the ban, offenders using AWs and other semiautomatics with LCMs (sometimes in addition to other guns) claimed an average of 29 victims in comparison to an average of 13 victims for other cases (Table 9-1). (But also see the study discussed in the preceding paragraph in regards to victims hit in AW cases.)

Further, a study of Milwaukee homicide victims from 1992 through 1995 revealed that those killed with AWs were shot 3.14 times on average, while those killed with any

[101] See the discussion of self-reports and AW use in Chapter 3.

gun having an LCM were shot 3.23 times on average (Table 9-2). In contrast, victims shot with guns having small magazines had only 2.1 wounds on average. If such a wound differential can be generalized to other gun attacks – if, that is, both fatal and non-fatal LCM gunshot victims are generally hit one or more extra times – then LCM use could have a considerable effect on the number of gunshot victims who die. To illustrate, the fatality rate among gunshot victims in Jersey City during the 1990s was 63% higher for those shot twice than for those shot once (26% to 16%) (Koper and Roth, 2001a; 2001b). Likewise, fatality rates are 61% higher for patients with multiple chest wounds than for patients with a single chest wound (49% to 30.5%), based on a Washington, DC study (Webster et al., 1992, p. 696).

Similar conclusions can also be inferred indirectly from the types of crimes involving LCM guns. To illustrate, handguns associated with gunshot victimizations in Baltimore (see the description of the Baltimore gun and magazine data in the preceding chapter) are 20% to 50% more likely to have LCMs than are handguns associated with other violent crimes, controlling for weapon caliber (Table 9-3). This difference may be due to higher numbers of shots and hits in crimes committed with LCMs, although it is also possible that offenders using LCMs are more likely to fire on victims. But controlling for gunfire, guns used in shootings are 17% to 26% more likely to have LCMs than guns used in gunfire cases resulting in no wounded victims (perhaps reflecting higher numbers of shots fired and victims hit in LCM cases), and guns linked to murders are 8% to 17% more likely to have LCMs than guns linked to non-fatal gunshot victimizations (perhaps indicating higher numbers of shots fired and wounds per victim in LCM cases).[102] These differences are not all statistically significant, but the pattern is consistent. And as discussed in Chapter 3, AWs account for a larger share of guns used in mass murders and murders of police, crimes for which weapons with greater firepower would seem particularly useful.

[102] Cases with and without gunfire and gunshot victims were approximated based on offense codes contained in the gun seizure data (some gunfire cases not resulting in wounded victims may not have been identified as such, and it is possible that some homicides were not committed with the guns recovered during the investigations). In order to control for caliber effects, we focused on 9mm and .38 caliber handguns. Over 80% of the LCM handguns linked to violent crimes were 9mm handguns. Since all (or virtually all) 9mm handguns are semiautomatics, we also selected .38 caliber guns, which are close to 9mm in size and consist almost entirely of revolvers and derringers.

The disproportionate involvement of LCM handguns in injury and death cases is greatest in the comparisons including both 9mm and .38 caliber handguns. This may reflect a greater differential in average ammunition capacity between LCM handguns and revolvers/derringers than between LCM handguns and other semiautomatics. The differential in fatal and non-fatal gunshot victims may also be due to caliber effects; 9mm is generally a more powerful caliber than .38 based on measures like kinetic energy or relative stopping power (e.g., see DiMaio, 1985, p. 140; Warner 1995, p. 223; Wintemute, 1996, p. 1751).

Table 9-3. Probabilities That Handguns Associated With Murders, Non-Fatal Shootings, and Other Violent Crimes Were Equipped With Large Capacity Magazines in Baltimore, 1993-2000

Handgun Sample	% With LCM	% Difference (#2 Relative to #1)
A. Handguns Used in Violent Crimes With and Without Gunshot Injury		
1) 9mm and .38: violence, no gunshot victims	23.21%	
2) 9mm and .38: violence with gunshot victims	34.87%	50%*
1) 9mm: violence, no gunshot victims	52.92%	
2) 9mm: violence with gunshot victims	63.24%	20%*
B. Handguns Used in Gunfire Cases With and Without Gunshot Injury		
1) 9mm and .38: gunfire, no gunshot victims	27.66%	
2) 9mm and .38: gunfire with gunshot victims	34.87%	26%
1) 9mm: gunfire, no gunshot victims	54.17%	
2) 9mm: gunfire with gunshot victims	63.24%	17%
C. Handguns Used in Fatal Versus Non-Fatal Gunshot Victimizations		
1) 9mm and .38: non-fatal gunshot victims	32.58%	
2) 9mm and .38: homicides	38.18%	17%
1) 9mm: non-fatal gunshot victims	61.14%	
2) 9mm: homicides	66.04%	8%

* Statistically significant difference at $p<.01$ (chi-square).

The findings of the preceding studies are subject to numerous caveats. There were few if any attempts to control for characteristics of the actors or situations that might have influenced weapon choices and/or attack outcomes.[103] Weapons data were typically missing for substantial percentages of cases. Further, many of the comparisons in the tables were not tested for statistical significance (see the notes to Tables 9-1 and 9-2).[104]

Tentatively, nonetheless, the evidence suggests more often than not that attacks with semiautomatics, particularly those equipped with LCMs, result in more shots fired, leading to both more injuries and injuries of greater severity. Perhaps the faster firing rate and larger ammunition capacities afforded by these weapons prompt some offenders to fire more frequently (i.e., encouraging what some police and military persons refer to as a "spray and pray" mentality). But this still begs the question of whether a 10-round limit on magazine capacity will affect the outcomes of enough gun attacks to measurably reduce gun injuries and deaths.

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[103] In terms of offender characteristics, recall from Chapter 3 that AP buyers are more likely than other gun buyers to have criminal histories and commit subsequent crimes. This does not seem to apply, however, to the broader class of semiautomatic users: handgun buyers with and without criminal histories tend to buy pistols in virtually the same proportions (Wintemute et al., 1998b), and youthful gun offenders using pistols and revolvers have very comparable criminal histories (Sheley and Wright, 1993b, p. 381). Further, semiautomatic users, including many of those using AWs, show no greater propensity to shoot at victims than do other gun offenders (Harlow, 2001, p. 11; Reedy and Koper, 2003). Other potential confounders to the comparisons in Tables 9-1 and 9-2 might include shooter age and skill, the nature of the circumstances (e.g., whether the shooting was an execution-style shooting), the health of the victim(s), the type of location (e.g., indoor or outdoor location), the distance between the shooter and intended victim(s), the presence of multiple persons who could have been shot intentionally or accidentally (as bystanders), and (in the mass shooting incidents) the use of multiple firearms.

[104] Tables 9-1 and 9-2 present the strongest evidence from the available studies. However, there are additional findings from these studies and others that, while weaker, are relevant. Based on gun model information available for a subset of cases in the Jersey City study, there were 12 gunfire cases involving guns manufactured with LCMs before the ban (7 of which resulted in wounded victims) and 94 gunfire cases involving revolvers or semiautomatic models without LCMs. Comparisons of these cases produced results similar to those of the main analysis: shot fired estimates ranged from 2.83 to 3.25 for the LCM cases and 2.22 to 2.6 for the non-LCM cases; 1.14 victims were wounded on average in the LCM gunshot cases and 1.06 in the non-LCM gunshot cases; and LCM gunshot victims had 1.14 wound on average, which, contrary to expectations, was less than the 1.47 average for other gunshot victims.

The compilation of mass shooting incidents cited in Table 9-1 had tentative shots fired estimates for 3 of the AW-LCM cases and 4 of the other cases. The AW-LCM cases averaged 93 shots per incident, a figure two and a half times greater than the 36.5 shot average for the other cases.

Finally, another study of firearm mass murders found that the average number of victims killed (tallies did not include others wounded) was 6 in AW cases and 4.5 in other cases (Roth and Koper, 1997, Appendix A). Only 2 of the 52 cases studied clearly involved AWs (or very similar guns). However, the make and model of the firearm were available for only eight cases, so additional incidents may have involved LCMs; in fact, at least 35% of the cases involved unidentified semiautomatics. (For those cases in which at least the gun type and firing action were known, semiautomatics outnumbered non-semiautomatics by 6 to 1, perhaps suggesting that semiautomatics are used disproportionately in mass murders.)

9.2.1. Will a 10-Round Magazine Limit Reduce Gunshot Victimizations?

Specific data on shots fired in gun attacks are quite fragmentary and often inferred indirectly, but they suggest that relatively few attacks involve more than 10 shots fired.[105] Based on national data compiled by the FBI, for example, there were only about 19 gun murder incidents a year involving four or more victims from 1976 through 1995 (for a total of 375) (Fox and Levin, 1998, p. 435) and only about one a year involving six or more victims from 1976 through 1992 (for a total of 17) (Kleck, 1997, p. 126). Similarly, gun murder victims are shot two to three times on average according to a number of sources (see Table 9-2 and Koper and Roth, 2001a), and a study at a Washington, DC trauma center reported that only 8% of all gunshot victims treated from 1988 through 1990 had five or more wounds (Webster et al., 1992, p. 696).

However, counts of victims hit or wounds inflicted provide only a lower bound estimate of the number of shots fired in an attack, which could be considerably higher in light of the low hit rates in gunfire incidents (see above).[106] The few available studies on shots fired show that assailants fire less than four shots on average (see sources in Table 9-1 and Goehl, 1993), a number well within the 10-round magazine limit imposed by the AW-LCM ban, but these studies have not usually presented the full distribution of shots fired for all cases, so it is usually unclear how many cases, if any, involved more than 10 shots.

An exception is the aforementioned study of handgun murders and assaults in Jersey City (Reedy and Koper, 2003). Focusing on cases for which at least the type of handgun (semiautomatic, revolver, derringer) could be determined, 2.5% of the gunfire cases involved more than 10 shots.[107] These incidents – all of which involved pistols – had a 100% injury rate and accounted for 4.7% of all gunshot victims in the sample (see Figure 9-2). Offenders fired a total of 83 shots in these cases, wounding 7 victims, only 1 of whom was wounded more than once. Overall, therefore, attackers fired over 8 shots

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[105] Although the focus of the discussion is on attacks with more than 10 shots fired, a gun user with a post-ban 10-round magazine can attain a firing capacity of 11 shots with many semiautomatics by loading one bullet into the chamber before loading the magazine.

[106] As a dramatic example, consider the heavily publicized case of Amadou Diallo, who was shot to death by four New York City police officers just a few years ago. The officers in this case fired upon Diallo 41 times but hit him with only 19 shots (a 46% hit rate), despite his being confined in a vestibule. Two of the officers reportedly fired until they had emptied their 16-round magazines, a reaction that may not be uncommon in such high-stress situations. In official statistics, this case will appear as having only one victim.

[107] The shots fired estimates were based on reported gunshot injuries, physical evidence (for example, shell casings found at the scene), and the accounts of witnesses and actors. The 2.5% figure is based on minimum estimates of shots fired. Using maximum estimates, 3% of the gunfire incidents involved more than 10 shots (Reedy and Koper, 2003, p. 154).

A caveat to these figures is that the federal LCM ban was in effect for much of the study period (which spanned January 1992 to November 1996), and a New Jersey ban on magazines with more than 15 rounds predated the study period. It is thus conceivable that these laws reduced attacks with LCM guns and attacks with more than 10 shots fired, though it seems unlikely that the federal ban had any such effect (see the analyses of LCM use presented in the previous chapter). Approximately 1% of the gunfire incidents involved more than 15 shots.

for every wound inflicted, suggesting that perhaps fewer persons would have been wounded had the offenders not been able to fire as often.[108]

Figure 9-2. Attacks With More Than 10 Shots Fired

Jersey City Handgun Attacks, 1992-1996

- **2.5% - 3% of gunfire incidents involved 11+ shots**
  - **3.6% - 4.2% of semiauto pistol attacks**
- **100% injury rate**
- **Produced 4.7% of all gunshot wound victims**
- **8.3 shots per gunshot wound**

Based on data reported by Reedy and Koper (2003). Injury statistics based on the 2.5% of cases involving 11+ shots by minimum estimate.

Caution is warranted in generalizing from these results because they are based on a very small number of incidents (6) from one sample in one city. Further, it is not known if the offenders in these cases had LCMs (gun model and magazine information was very limited); they may have emptied small magazines, reloaded, and continued firing. But subject to these caveats, the findings suggest that the ability to deliver more than 10 shots without reloading may be instrumental in a small but non-trivial percentage of gunshot victimizations.

On the other hand, the Jersey City study also implies that eliminating AWs and LCMs might only reduce gunshot victimizations by up to 5%. And even this estimate is probably overly optimistic because the LCM ban cannot be expected to prevent all incidents with more than 10 shots. Consequently, any effects from the ban (should it be extended) are likely to be smaller and perhaps quite difficult to detect with standard statistical methods (see Koper and Roth, 2001a), especially in the near future, if recent patterns of LCM use continue.

9.3. Post-Ban Trends in Lethal and Injurious Gun Violence

Having established some basis for believing the AW-LCM ban could have at least a small effect on lethal and injurious gun violence, is there any evidence of such an effect to date? Gun homicides plummeted from approximately 16,300 in 1994 to 10,100 in 1999, a reduction of about 38% (see the Federal Bureau of Investigation's *Uniform Crime*

[108] These figures are based on a supplemental analysis not contained in the published study. We thank Darin Reedy for this analysis.

Reports). Likewise, non-fatal, assaultive gunshot injuries treated in hospitals nationwide declined one-third, from about 68,400 to under 46,400, between 1994 and 1998 (Gotsch et al., 2001, pp. 23-24). Experts believe numerous factors contributed to the recent drop in these and other crimes, including changing drug markets, a strong economy, better policing, and higher incarceration rates, among others (Blumstein and Wallman, 2000). Attributing the decline in gun murders and shootings to the AW-LCM ban is problematic, however, considering that crimes with LCMs appear to have been steady or rising since the ban. For this reason, we do not undertake a rigorous investigation of the ban's effects on gun violence.[109]

But a more casual assessment shows that gun crimes since the ban have been no less likely to cause death or injury than those before the ban, contrary to what we might expect if crimes with AWs and LCMs had both declined. For instance, the percentage of violent gun crimes resulting in death has been very stable since 1990 according to national statistics on crimes reported to police (see Figure 9-1 in section 9.1).[110] In fact, the percentage of gun crimes resulting in death during 2001 and 2002 (2.94%) was slightly higher than that during 1992 and 1993 (2.9%).

Similarly, neither medical nor criminological data sources have shown any post-ban reduction in the percentage of crime-related gunshot victims who die. If anything, this percentage has been higher since the ban, a pattern that could be linked in part to more multiple wound victimizations stemming from elevated levels of LCM use. According to medical examiners' reports and hospitalization estimates, about 20% of gunshot victims died nationwide in 1993 (Gotsch et al., 2001). This figure rose to 23% in 1996, before declining to 21% in 1998 (Figure 9-3).[111] Estimates derived from the Uniform Crime Reports and the Bureau of Justice Statistics' annual National Crime Victimization Survey follow a similar pattern from 1992 to 1999 (although the ratio of fatal to non-fatal cases is much higher in these data than that in the medical data) and also show a considerable increase in the percentage of gunshot victims who died in 2000 and 2001 (Figure 9-3).[112] Of course, changes in offender behavior or other changes in crime

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[109] In our prior study (Koper and Roth 2001a; Roth and Koper, 1997, Chapter 6), we estimated that gun murders were about 7% lower than expected in 1995 (the first year after the ban), adjusting for pre-existing trends. However, the very limited post-ban data available for that study precluded a definitive judgment as to whether this drop was statistically meaningful (see especially Koper and Roth, 2001a). Furthermore, that analysis was based on the assumption that crimes with both AWs and LCMs had dropped in the short-term aftermath of the ban, an assumption called into question by the findings of this study. It is now more difficult to credit the ban with any of the drop in gun murders in 1995 or anytime since. We did not update the gun murder analysis because interpreting the results would be unavoidably ambiguous. Such an investigation will be more productive after demonstrating that the ban has reduced crimes with both AWs and LCMs.

[110] The decline in this figure during the 1980s was likely due in part to changes in police reporting of aggravated assaults in recent decades (Blumstein, 2000). The ratio of gun murders to gun robberies rose during the 1980s, then declined and remained relatively flat during the 1990s.

[111] Combining homicide data from 1999 with non-fatal gunshot estimates for 2000 suggests that about 20% of gunshot victimizations resulted in death during 1999 and 2000 (Simon et al., 2002).

[112] The SHR/NCVS estimates should be interpreted cautiously because the NCVS appears to undercount non-fatal gunshot wound cases by as much as two-thirds relative to police data, most likely because it fails to represent adequately the types of people most likely to be victims of serious crime (i.e., young urban males who engage in deviant lifestyles) (Cook, 1985). Indeed, the rate of death among gunshot victims

weaponry (such as an increase in shootings with large caliber handguns) may have influenced these trends. Yet is worth noting that multiple wound shootings were elevated over pre-ban levels during 1995 and 1996 in four of five localities examined during our first AW study, though most of the differences were not statistically significant (Table 9-4, panels B through E).

Another potential indicator of ban effects is the percentage of gunfire incidents resulting in fatal or non-fatal gunshot victimizations. If attacks with AWs and LCMs result in more shots fired and victims hit than attacks with other guns and magazines, we might expect a decline in crimes with AWs and LCMs to reduce the share of gunfire incidents resulting in victims wounded or killed. Measured nationally with UCR and NCVS data, this indicator was relatively stable at around 30% from 1992 to 1997, before rising to about 40% from 1998 through 2000 (Figure 9-4).[113] Along similar lines, multiple victim gun homicides remained at relatively high levels through at least 1998, based on the national average of victims killed per gun murder incident (Table 9-4, panel A).[114]

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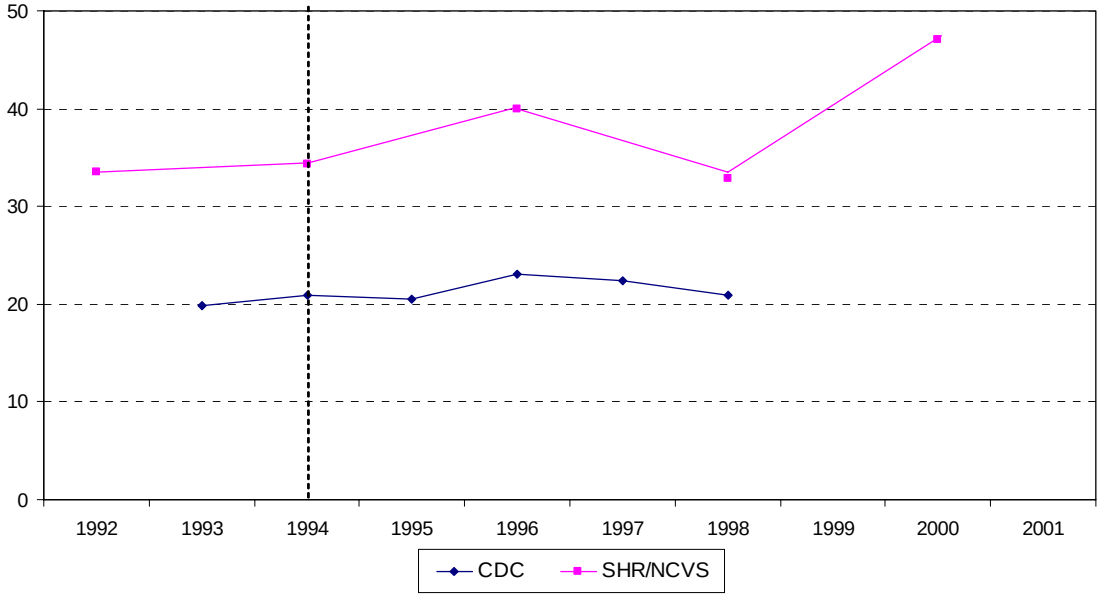
appears much higher in the SHR/NCVS series than in data compiled from medical examiners and hospitals (see the CDC series in Figure 9-3). But if these biases are relatively consistent over time, the data may still provide useful insights into trends over time.

[113] The NCVS estimates are based on a compilation of 1992-2002 data recently produced by the Inter-University Consortium for Political and Social Research (ICPSR study 3691). In 2002, only 9% of non-fatal gunfire incidents resulted in gunshot victimizations. This implies a hit rate for 2002 that was below pre-ban levels, even after incorporating gun homicide cases into the estimate. However, the 2002 NCVS estimate deviates quite substantially from earlier years, for which the average hit rate in non-fatal gunfire incidents was 24% (and the estimate for 2001 was 20%). Therefore, we did not include the 2002 data in our analysis. We used two-year averages in Figures 9-3 and 9-4 because the annual NCVS estimates are based on very small samples of gunfire incidents. The 2002 sample was especially small, so it seems prudent to wait for more data to become available before drawing conclusions about hit rates since 2001.

[114] We thank David Huffer for this analysis.

Figure 9-3. Percentage of Gunshot Victimizations Resulting in Death (National), 1992-2001



SHR/NCVS series based on two-year averages from the Supplemental Homicide Reports and National Crime Victimization Survey. CDC series based on homicide and hospitalization data from the Centers for Disease Control (reported by Gotsch et al. 2001).

Table 9-4. Short-Term, Post-Ban Changes in the Lethality and Injuriousness of Gun Violence: National and Local Indicators, 1994-1998 [a]

Measure and Location	Pre-Ban Period	Post-Ban Period	Change
A. Victims Per Gun Homicide Incident (National)	Jan. 1986-Sept. 1994 1.05 (N=106,668)	Oct. 1994-Dec. 1998 1.06 (N=47,511)	1%**
B. Wounds per Gun Homicide Victim: Milwaukee County	Jan. 1992-Aug. 1994 2.28 (N=282)	Sept. 1994-Dec. 1995 2.52 (N=136)	11%
C. Wounds Per Gun Homicide Victim: Seattle (King County)	Jan. 1992-Aug. 1994 2.08 (N=184)	Sept. 1994-Jun. 1996 2.46 (N=91)	18%
D. Wounds Per Gunshot Victim: Jersey City (NJ)	Jan. 1992-Aug. 94 1.42 (N=125)	Sept. 1994-Jun. 1996 1.39 (N=137)	-2%
E. % of Gun Homicide Victims With Multiple Wounds: San Diego County	Jan. 1992-Aug. 1994 41% (N=445)	Sept. 1994-Jun. 1996 43% (N=223)	5%
F. % of Non-Fatal Gunshot Victims With Multiple Wounds: Boston	Jan. 1992-Aug. 1994 18% (N=584)	Sept. 1994-Dec. 1995 24% (N=244)	33%*

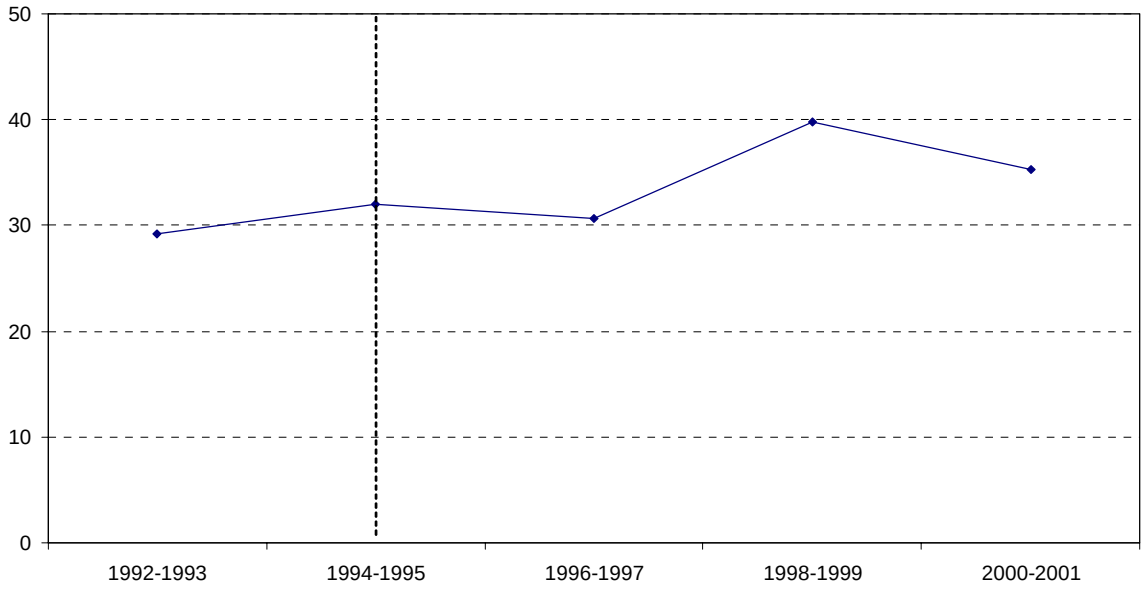
a. National victims per incident figures based on unpublished update of analysis reported in Roth and Koper (1997, Chapter 5). Gunshot wound data are taken from Roth and Koper (1997, Chapter 6) and Koper and Roth (2001a). Wound data are based on medical examiners' reports (Milwaukee, Seattle, San Diego), hospitalization data (Boston), and police reports (Jersey City).

* Chi-square p level < .1.

** T-test p level < .01.

If anything, therefore, gun attacks appear to have been more lethal and injurious since the ban. Perhaps elevated LCM use has contributed to this pattern. But if this is true, then the reverse would also be true – a reduction in crimes with LCMs, should the ban be extended, would reduce injuries and deaths from gun violence.

Figure 9-4. Percentage of Gunfire Cases Resulting in Gunshot Victimizations (National), 1992-2001



Based on two-year averages from the Supplemental Homicide Reports and National Crime Victimization Survey.

9.4. Summary

Although the ban has been successful in reducing crimes with AWs, any benefits from this reduction are likely to have been outweighed by steady or rising use of non-banned semiautomatics with LCMs, which are used in crime much more frequently than AWs. Therefore, we cannot clearly credit the ban with any of the nation's recent drop in gun violence. And, indeed, there has been no discernible reduction in the lethality and injuriousness of gun violence, based on indicators like the percentage of gun crimes resulting in death or the share of gunfire incidents resulting in injury, as we might have expected had the ban reduced crimes with both AWs and LCMs.

However, the grandfathering provision of the AW-LCM ban guaranteed that the effects of this law would occur only gradually over time. Those effects are still unfolding and may not be fully felt for several years into the future, particularly if foreign, pre-ban LCMs continue to be imported into the U.S. in large numbers. It is thus premature to make definitive assessments of the ban's impact on gun violence.

Having said this, the ban's impact on gun violence is likely to be small at best, and perhaps too small for reliable measurement. AWs were used in no more than 8% of gun crimes even before the ban. Guns with LCMs are used in up to a quarter of gun crimes, but it is not clear how often the outcomes of gun attacks depend on the ability to fire more than 10 shots (the current limit on magazine capacity) without reloading.

Nonetheless, reducing crimes with AWs and especially LCMs could have non-trivial effects on gunshot victimizations. As a general matter, hit rates tend to be low in gunfire incidents, so having more shots to fire rapidly can increase the likelihood that offenders hit their targets, and perhaps bystanders as well. While not entirely consistent, the few available studies contrasting attacks with different types of guns and magazines generally suggest that attacks with semiautomatics – including AWs and other semiautomatics with LCMs – result in more shots fired, persons wounded, and wounds per victim than do other gun attacks. Further, a study of handgun attacks in one city found that about 3% of gunfire incidents involved more than 10 shots fired, and those cases accounted for nearly 5% of gunshot victims. However, the evidence on these matters is too limited (both in volume and quality) to make firm projections of the ban's impact, should it be reauthorized.

10. LOOKING TO THE FUTURE: RESEARCH RECOMMENDATIONS AND SPECULATION ABOUT THE CONSEQUENCES OF REAUTHORIZING, MODIFYING, OR LIFTING THE ASSAULT WEAPONS BAN

In this chapter, we discuss future lines of inquiry that would be informative whether or not the AW-LCM ban is renewed in September 2004. We then offer some brief thoughts about the possible consequences of reauthorizing the ban, modifying it, or allowing it to expire.

10.1. Research Recommendations and Data Requirements

10.1.1. An Agenda for Assault Weapons Research and Recommendations for Data Collection by Law Enforcement

The effects of the AW-LCM ban have yet to be fully realized; therefore, we recommend continued study of trends in the availability and criminal use of AWs and LCMs. Even if the ban is lifted, longer-term study of crimes with AWs and LCMs will inform future assessment of the consequences of these policy shifts and improve understanding of the responses of gun markets to gun legislation more generally.[115]

Developing better data on crimes with LCMs is especially important. To this end, we urge police departments and their affiliated crime labs to record information about magazines recovered with crime guns. Further, we recommend that ATF integrate ammunition magazine data into its national gun tracing system and encourage reporting of magazine data by police departments that trace firearms.

As better data on LCM use become available, more research is warranted on the impacts of AW and LCM trends (which may go up or down depending on the ban's fate) on gun murders and shootings, as well as levels of death and injury per gun crime. Indicators of the latter, such as victims per gunfire incident and wounds per gunshot victim, are useful complementary outcome measures because they reflect the mechanisms through which use of AWs and LCMs is hypothesized to affect gun deaths and injuries.[116] Other potentially promising lines of inquiry might relate AW and LCM use to mass murders and murders of police, crimes that are very rare but appear more likely to involve AWs (and perhaps LCMs) and to disproportionately affect public perceptions.[117]

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[115] Establishing time series data on primary and secondary market prices and production or importation of various guns and magazines of policy interest could provide benefits for policy researchers. Like similar statistical series maintained for illegal drugs, such price and production series would be valuable instruments for monitoring effects of policy changes and other influences on markets for various weapons.

[116] However, more research is needed on the full range of factors that cause variation in these indicators over time and between places.

[117] Studying these crimes poses a number of challenges, including modeling of rare events, establishing the reliability and validity of methods for measuring the frequency and characteristics of mass murders (such as through media searchers; see Duwe, 2000, Roth and Koper, 1997, Appendix A), and controlling for factors like the use of bullet-proof vests by police.

Finally, statistical studies relating AW and LCM use to trends in gun violence should include statistical power analysis to ensure that estimated models have sufficient ability to detect small effects, an issue that has been problematic in some of our prior time series research on the ban (Koper and Roth, 2001a) and is applicable more generally to the study of modest, incremental policy changes.

Research on aggregate trends should be complemented by more incident-based studies that contrast the dynamics and outcomes of attacks with different types of guns and magazines, while controlling for relevant characteristics of the actors and situations. Such studies would refine predictions of the change in gun deaths and injuries that would follow reductions in attacks with AWs and LCMs. For instance, how many homicides and injuries involving AWs and LCMs could be prevented if offenders were forced to substitute other guns and magazines? In what percentage of gun attacks does the ability to fire more than ten rounds without reloading affect the number of wounded victims or determine the difference between a fatal and non-fatal attack? Do other AW features (such as flash hiders and pistol grips on rifles) have demonstrable effects on the outcomes of gun attacks? Studies of gun attacks could draw upon police incident reports, forensic examinations of recovered guns and magazines, and medical and law enforcement data on wounded victims.

10.1.2. Studying the Implementation and Market Impacts of Gun Control

More broadly, this study reiterates the importance of examining the implementation of gun policies and the workings of gun markets, considerations that have been largely absent from prior research on gun control. Typical methods of evaluating gun policies involve statistical comparisons of total or gun crime rates between places and/or time periods with and without different gun control provisions. Without complimentary implementation and market measures, such studies have a "black box" quality and may lead to misleading conclusions. For example, a time series study of gun murder rates before and after the AW-LCM ban might find that the ban has not reduced gun murders. Yet the interpretation of such a finding would be ambiguous, absent market or implementation measures. Reducing attacks with AWs and LCMs may in fact have no more than a trivial impact on gun deaths and injuries, but any such impact cannot be realized or adequately assessed until the availability and use of the banned guns and magazines decline appreciably. Additionally, it may take many years for the effects of modest, incremental policy changes to be fully felt, a reality that both researchers and policy makers should heed. Similar implementation concerns apply to the evaluation of various gun control policies, ranging from gun bans to enhanced sentences for gun offenders.

Our studies of the AW ban have shown that the reaction of manufacturers, dealers, and consumers to gun control policies can have substantial effects on demand and supply for affected weapons both before and after a law's implementation. It is important to study these factors because they affect the timing and form of a law's impact

on the availability of weapons to criminals and, by extension, the law's impact on gun violence.

10.2. Potential Consequences of Reauthorizing, Modifying, or Lifting the Assault Weapons Ban

10.2.1. Potential Consequences of Reauthorizing the Ban As Is

Should it be renewed, the ban might reduce gunshot victimizations. This effect is likely to be small at best and possibly too small for reliable measurement. A 5% reduction in gunshot victimizations is perhaps a reasonable upper bound estimate of the ban's potential impact (based on the only available estimate of gunshot victimizations resulting from attacks in which more than 10 shots were fired), but the actual impact is likely to be smaller and may not be fully realized for many years into the future, particularly if pre-ban LCMs continue to be imported into the U.S. from abroad. Just as the restrictions imposed by the ban are modest – they are essentially limits on weapon accessories like LCMs, flash hiders, threaded barrels, and the like – so too are the potential benefits.[118] In time, the ban may be seen as an effective prevention measure that stopped further spread of weaponry considered to be particularly dangerous (in a manner similar to federal restrictions on fully automatic weapons). But that conclusion will be contingent on further research validating the dangers of AWs and LCMs.

10.2.2. Potential Consequences of Modifying the Ban

We have not examined the specifics of legislative proposals to modify the AW ban. However, we offer a few general comments about the possible consequences of such efforts, particularly as they relate to expanding the range of the ban as some have advocated (Halstead, 2003, pp. 11-12).

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[118] But note that although the ban's impact on gunshot victimizations would be small in percentage terms and unlikely to have much effect on the public's fear of crime, it could conceivably prevent hundreds of gunshot victimizations annually and produce notable cost savings in medical care alone. To help place this in perspective, there were about 10,200 gun homicides and 48,600 non-fatal, assault-related shootings in 2000 (see the FBI's *Uniform Crime Reports* for the gun homicide estimate and Simon et al. [2002] for the estimate of non-fatal shootings). Reducing these crimes by 1% would have thus prevented 588 gunshot victimizations in 2000 (we assume the ban did not actually produce such benefits because the reduction in AW use as of 2000 was outweighed by steady or rising levels of LCM use). This may seem insubstantial compared to the 342,000 murders, assaults, and robberies committed with guns in 2000 (see the *Uniform Crime Reports*). Yet, gunshot victimizations are particularly costly crimes. Setting aside the less tangible costs of lost lives and human suffering, the lifetime medical costs of assault-related gunshot injuries (fatal and non-fatal) were estimated to be about $18,600 per injury in 1994 (Cook et al., 1999). Therefore, the lifetime costs of 588 gun homicides and shootings would be nearly $11 million in 1994 dollars (the net medical costs could be lower for reasons discussed by Cook and Ludwig [2000] but, on the other hand, this estimate does not consider other governmental and private costs that Cook and Ludwig attribute to gun violence). This implies that small reductions in gunshot victimizations sustained over many years could produce considerable long-term savings for society. We do not wish to push this point too far, however, considering the uncertainty regarding the ban's potential impact.

Gun markets react strongly merely to debates over gun legislation. Indeed, debate over the AW ban's original passage triggered spikes upwards of 50% in gun distributors' advertised AW prices (Roth and Koper, 1997, Chapter 4). In turn, this prompted a surge in AW production in 1994 (Chapter 5). Therefore, it seems likely that discussion of broadening the AW ban to additional firearms would raise prices and production of the weapons under discussion. (Such market reactions may already be underway in response to existing proposals to expand the ban, but we have not investigated this issue.) Heightened production levels could saturate the market for the weapons in question, depressing prices and delaying desired reductions in crimes with the weapons, as appears to have happened with banned ARs.

Mandating further design changes in the outward features of semiautomatic weapons (e.g., banning weapons having any military-style features) may not produce benefits beyond those of the current ban. As noted throughout this report, the most important feature of military-style weapons may be their ability to accept LCMs, and this feature has been addressed by the LCM ban and the LCMM rifle ban. Whether changing other features of military-style firearms will produce measurable benefits is unknown.

Finally, curbing importation of pre-ban LCMs should help reduce crimes with LCMs and possibly gunshot victimizations. Crimes with LCMs may not decline substantially for quite some time if millions of LCMs continue to be imported into the U.S.

10.2.3. Potential Consequences of Lifting the Ban

If the ban is lifted, it is likely that gun and magazine manufacturers will reintroduce AW models and LCMs, perhaps in substantial numbers.[119] In addition, AWs grandfathered under the 1994 law may lose value and novelty, prompting some of their lawful owners to sell them in secondary markets, where they may reach criminal users. Any resulting increase in crimes with AWs and LCMs might increase gunshot victimizations, though this effect could be difficult to discern statistically.

It is also possible, and perhaps probable, that new AWs and LCMs will eventually be used to commit mass murder. Mass murders garner much media attention, particularly when they involve AWs (Duwe, 2000). The notoriety likely to accompany mass murders if committed with AWs and LCMs, especially after these guns and magazines have been deregulated, could have a considerable negative impact on public perceptions, an effect that would almost certainly be intensified if such crimes were committed by terrorists operating in the U.S.

[119] Note, however, that foreign semiautomatic rifles with military features, including the LCMM rifles and several rifles prohibited by the 1994 ban, would still be restricted by executive orders passed in 1989 and 1998. Those orders stem from the sporting purposes test of the Gun Control Act of 1968.

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EXHIBIT 54

U.S. Department of Justice
Office of Justice Programs
Bureau of Justice Statistics

SPECIAL REPORT

APRIL 2022 NCJ 251663

Trends and Patterns in Firearm Violence, 1993–2018

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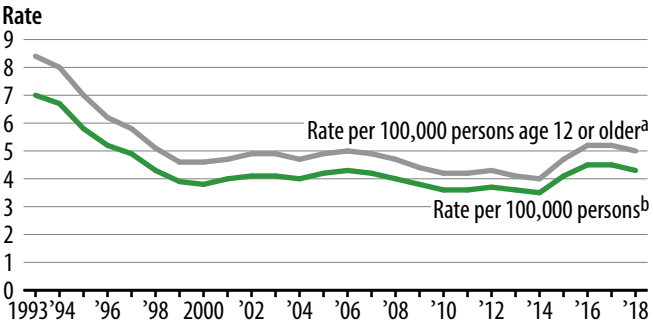
The rate of firearm homicide per 100,000 persons age 12 or older declined 41% across the 26-year period of 1993 to 2018, from 8.4 to 5.0 homicides per 100,000 **(figure 1)**. During the more recent 5 years from 2014 to 2018, this rate was between 4.0 and 5.2 homicides per 100,000 persons age 12 or older. A total of 150 persons age 11 or younger were victims of firearm homicide in 2018, resulting in a rate of 0.3 homicides per 100,000 persons in this age group (not shown).

Firearm homicides include fatal injuries that involved a firearm and were inflicted by another person with intent to injure or kill by any means. Homicide data in this report are primarily from mortality data in the Center for Disease Control and Prevention's (CDC) Web-based Injury Statistics Query and Reporting System (WISQARS) Fatal Injury Reports. WISQARS data are based on death certificates in the National Vital Statistics System (NVSS) of the National Center for Health Statistics.

In 2018, some 14,000 homicides were committed with a firearm **(table 1)**. The number of firearm homicides involving persons age 12 or older declined 23% across 26 years, from 18,000 in 1993 to 13,800 in 2018.

FIGURE 1
Rate of firearm homicide per 100,000 persons, 1993–2018



Note: Includes fatal injuries involving a firearm inflicted by another person with intent to injure or kill by any means. Includes homicides due to the events of September 11, 2001. Excludes homicides due to legal intervention and operations of war. See table 1 for rates and appendix table 1 for population estimates.
[a]Includes homicides of persons age 12 or older.
[b]Includes homicides of all persons of known or unknown age.
Source: Centers for Disease Control and Prevention, National Center for Injury Prevention and Control, Web-based Injury Statistics Query and Reporting System Fatal Injury Reports developed from the National Vital Statistics System, 1993–2018.

HIGHLIGHTS

- The firearm homicide rate decreased 41% overall from 1993 to 2018 (from 8.4 to 5.0 homicides per 100,000 persons age 12 or older), reaching a low of 4.0 per 100,000 in 2014 before rising to 5.0 per 100,000 in 2018.
- The rate of nonfatal firearm violence for persons age 12 or older declined 76% from 1993 to 2018, dropping from 7.3 to 1.7 victimizations per 1,000, and ranging from 1.1 to 1.8 per 1,000 from 2014 to 2018.
- From 1993 to 2018, on average, 71% of homicides were committed with a firearm.
- The majority of firearm violence involved the use of a handgun from 1993 to 2018.
- During the aggregate period of 2014–18, males had higher rates than females of both firearm homicide and nonfatal firearm victimization.
- Persons ages 18 to 24 had the highest firearm homicide rate among persons age 12 or older (11.6 homicides per 100,000) during 2014–18.
- Nearly 70% of nonfatal firearm violence was reported to police during 2014–18.

Data sources, measures, and definitions of firearm violence

This report uses information from several data sources to examine trends and patterns in firearm violence from 1993 to 2018 and the more recent period of 2014 to 2018, including death certificates, data reported to law enforcement agencies, and victimization survey estimates. These sources have different methodologies and provide distinct information about firearm-related crimes, victims, and incidents. Together, these complementary measures provide a broad overview of firearm violence in the United States. For more information about the data sources used in this report, see *Methodology*.

Firearm homicide data

Homicide data in this report are primarily from the Web-based Injury Statistics Query and Reporting System (WISQARS) Fatal Injury Reports developed from the National Vital Statistics System (NVSS) of the National Center for Health Statistics (NCHS), a part of the Centers for Disease Control and Prevention. NVSS mortality data are produced from standardized death certificates and include causes of death reported by attending physicians, medical examiners, and coroners.

NVSS data also include demographic information about decedents reported by funeral directors who obtain such details from family members and other informants. The NCHS collects, compiles, verifies, and prepares these data for release to the public. Additional information in this report on firearm-related homicides comes from the FBI's Supplementary Homicide Reports (SHR).

Generally, the NVSS produces more accurate information than the SHR on annual homicide rates at the national level, though trends from the two data sources tend to be similar. (See *The Nation's Two Measures of Homicide* (NCJ 247060, BJS, July 2014) for more information.) The NVSS includes more complete state and local jurisdiction reporting and has more complete information about victim characteristics. However, because NVSS data do not provide detailed information about homicide incidents, SHR data are used for table 4, which shows firearm homicides by type of gun involved.

Nonfatal firearm violence data

The Bureau of Justice Statistics' National Crime Victimization Survey (NCVS) is the source for nonfatal firearm violence data in this report. The NCVS collects information on nonfatal crimes against persons age 12 or older reported and not reported to police from a nationally representative sample of U.S. households. It provides detailed data on the characteristics of nonfatal firearm violence. While most NCVS estimates in this report are based on victimizations, table 13 presents incident-level data to facilitate comparisons between victim and offender demographic characteristics.

Measures and definitions

Rates are presented per 100,000 persons for homicide and per 1,000 persons age 12 or older for nonfatal victimization. Trend estimates of nonfatal firearm violence by type of gun are presented as 3-year rolling averages. Several tables in this report focus on aggregate periods of multiple years, such as 2014 through 2018, with some presenting data as annual average estimates and others as aggregate estimates for the period. These approaches—using rolling averages and aggregated years—increase the reliability and stability of the estimates of nonfatal violence, which facilitates comparisons over time and between subgroups. Estimates are shown for different years based on data availability and measures of reliability.

Key terms used in the report

Firearm—A weapon that fires a projectile by force of an explosion, e.g., handguns, rifles, and shotguns.

Firearm homicide (NVSS)—Includes fatal injuries that involved a firearm and were inflicted by another person with intent to injure or kill by any means. Fatal firearm injuries are gunshot wounds or penetrating injuries from a weapon that uses a powder charge to fire a projectile. Includes homicides due to the events of September 11, 2001. Excludes homicides due to legal intervention and operations of war.

Firearm homicide (SHR)—Includes both murders and nonnegligent manslaughters that involved a firearm and the willful killing of one human being by another. Excludes justifiable homicides, nonnegligent manslaughter, and homicides resulting from operations of war and the terrorist attacks of September 11, 2001.

Nonfatal firearm violence (NCVS)—Includes rape or sexual assault, robbery, and aggravated assault victimizations against persons age 12 or older in which the offender had, showed, or used a firearm, and excludes simple assault victimizations. For more information on these crime types, see *Criminal Victimization, 2018* (NCJ 251150, BJS, December 2017).

Nonfatal violence excluding simple assault (NCVS)—Includes rape or sexual assault, robbery, and aggravated assault against persons age 12 or older.

Nonfatal violent and property victimizations (NCVS)—The total number of times that persons or households were victimized by crime. For crimes against persons, the number of victimizations is the number of victims of that crime. For crimes against households, each crime is counted as having a single victim (the affected household).

Nonfatal violent incidents (NCVS)—The number of specific criminal acts involving one or more victims.

Trends in firearm homicide and nonfatal firearm violence

In 2018, there were 470,800 nonfatal firearm victimizations against persons age 12 or older, down 69% from 1.5 million in 1993 **(table 2)**. Data on nonfatal firearm violence in this report are from the Bureau of Justice Statistics' National Crime Victimization Survey (NCVS) and include rape or sexual assault, robbery, and aggravated assault victimizations against persons age 12 or older in which the offender had, showed, or used a firearm. Across this period, the rate of nonfatal firearm violence declined 76%, from 7.3 to 1.7 victimizations per 1,000 persons age 12 or older **(figure 2)**. This rate varied from 1.1 to 1.8 per 1,000 during the 5 years from 2014 to 2018.

TABLE 1
Firearm homicide, 1993–2018

	All persons[a]		Persons age 12 or older[b]	
Year	Number	Rate per 100,000	Number	Rate per 100,000
1993	18,300	7.0	18,000	8.4
1994	17,500	6.7	17,300	8.0
1995	15,600	5.8	15,300	7.0
1996	14,000	5.2	13,800	6.2
1997	13,300	4.9	13,100	5.8
1998	11,800	4.3	11,600	5.1
1999	10,800	3.9	10,700	4.6
2000	10,800	3.8	10,700	4.6
2001	11,300	4.0	11,200	4.7
2002	11,800	4.1	11,700	4.9
2003	11,900	4.1	11,800	4.9
2004	11,600	4.0	11,500	4.7
2005	12,400	4.2	12,200	4.9
2006	12,800	4.3	12,600	5.0
2007	12,600	4.2	12,500	4.9
2008	12,200	4.0	12,000	4.7
2009	11,500	3.8	11,300	4.4
2010	11,100	3.6	10,900	4.2
2011	11,100	3.6	10,900	4.2
2012	11,600	3.7	11,500	4.3
2013	11,200	3.6	11,100	4.1
2014	11,000	3.5	10,900	4.0
2015	13,000	4.1	12,800	4.7
2016	14,400	4.5	14,300	5.2
2017	14,500	4.5	14,400	5.2
2018	14,000	4.3	13,800	5.0

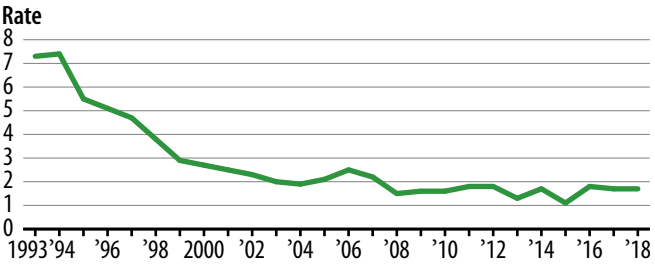
Note: Includes fatal injuries involving a firearm inflicted by another person with intent to injure or kill by any means. Includes homicides due to the events of September 11, 2001. Excludes homicides due to legal intervention and operations of war. See appendix table 1 for population estimates.

[a]Includes homicides of all persons of known or unknown age.

[b]Includes homicides of persons age 12 or older.

Source: Centers for Disease Control and Prevention, National Center for Injury Prevention and Control, Web-based Injury Statistics Query and Reporting System Fatal Injury Reports developed from the National Vital Statistics System, 1993–2018.

FIGURE 2
Rate of nonfatal firearm victimization per 1,000 persons age 12 or older, 1993–2018



Note: Includes rape or sexual assault, robbery, and aggravated assault victimizations of persons age 12 or older in which the offender had, showed, or used a firearm. See table 2 for rates and appendix table 2 for population estimates and standard errors.

Source: Bureau of Justice Statistics, National Crime Victimization Survey, 1993–2018.

TABLE 2
Nonfatal firearm victimization against persons age 12 or older, 1993–2018

Year	Number of victimizations	Rate per 1,000
1993	1,529,700 †	7.3 †
1994	1,568,200 †	7.4 †
1995	1,193,200 †	5.5 †
1996	1,100,800 †	5.1 †
1997	1,024,100 †	4.7 †
1998	835,400 †	3.8 †
1999	640,900	2.9 †
2000	610,200	2.7 †
2001	563,100	2.5 ‡
2002	540,000	2.3
2003	467,300	2.0
2004	456,500	1.9
2005	503,500	2.1
2006	614,400	2.5 ‡
2007	554,800	2.2
2008	371,300	1.5
2009	410,100	1.6
2010	415,000	1.6
2011	467,900	1.8
2012	460,700	1.8
2013	333,000	1.3
2014	466,100	1.7
2015	284,900 †	1.1 †
2016	486,600	1.8
2017	456,300	1.7
2018*	470,800	1.7

Note: Includes rape or sexual assault, robbery, and aggravated assault victimizations of persons age 12 or older in which the offender had, showed, or used a firearm. See appendix table 2 for population estimates and standard errors.

*Comparison year.

†Difference with comparison year is significant at the 95% confidence level.

‡Difference with comparison year is significant at the 90% confidence level.

Source: Bureau of Justice Statistics, National Crime Victimization Survey, 1993–2018.

The majority of homicides were committed with a firearm from 1993 to 2018

From 1993 to 2018, an annual average of 8% of all fatal and nonfatal violence involved a firearm **(table 3)**. The average percentage of nonfatal violence that involved a firearm was 7%. On average, 71% of homicides were committed with a firearm from 1993 to 2018. During the same period, an annual average of 22% of nonfatal violence, excluding simple assault, involved a firearm, including 23% of robberies and 27% of aggravated assaults.[1]

[1]Estimates on rape/sexual assault victimizations involving firearms are not shown separately due to small sample sizes.

TABLE 3
Percent of fatal and nonfatal violence involving a firearm, by type of crime, 1993–2018

Year	All fatal and nonfatal violence	Homicide[a]	Nonfatal violence[b]	Nonfatal violence excluding simple assault[c]	Robbery	Aggravated assault
Average annual percentage, 1993–2018	7.6%	71.2%	7.4%	22.0%	22.6%	26.8%
1993	9.2	73.4	9.1	24.9 ‡	22.3	30.7
1994	9.3	73.7	9.2	27.2 †	27.1 †	31.9
1995	7.9	71.3	7.8	24.8 ‡	27.3 †	28.0
1996	7.9	70.7	7.8	23.2	24.6 ‡	25.7
1997	7.7	70.5	7.6	22.1	19.9	27.0
1998	7.0	68.9	7.0	22.7	20.1	26.5
1999	6.1	67.2	6.0	17.9	19.2	22.4 †
2000	7.3	67.4	7.2	21.7	21.1	26.6
2001[d]	7.7	57.8	7.5	22.3	29.5 †	26.0
2002	7.4	69.9	7.3	23.4	23.4	28.7
2003	6.2	70.1	6.1	19.5	22.4	22.2 †
2004	6.9	69.9	6.8	19.9	19.7	23.6 ‡
2005	7.4	70.9	7.2	22.3	21.8	25.7
2006[e]	7.4	71.7	7.3	19.5	16.6	24.3
2007[e]	8.3	71.7	8.1	24.7	20.0	32.6
2008	6.0	71.3	5.8	18.6	19.6	24.6
2009	7.4	71.3	7.2	20.8	27.0 ‡	23.2
2010	8.6	71.1	8.4	24.5	24.7	25.4
2011	8.2	71.2	8.1	25.2	25.7	30.6
2012	6.9	72.3	6.7	22.1	29.4 †	24.1
2013	5.6	72.3	5.4	17.2	16.8	22.3 ‡
2014	8.9	72.0	8.7	22.8	20.7	29.7
2015	5.9	75.6	5.7	15.6	16.0	22.6 ‡
2016	9.3	76.8	9.1	27.1 †	26.5 ‡	33.9
2017	8.4	76.9	8.1	22.8	29.1 †	27.7
2018*	7.6	76.5	7.4	19.9	16.8	31.9

Note: Fatal firearm violence includes fatal injuries involving a firearm inflicted on persons age 12 or older by another person with intent to injure or kill by any means. Includes homicides due to the events of September 11, 2001. Excludes homicides due to legal intervention and operations of war. Nonfatal firearm violence includes rape or sexual assault, robbery, and aggravated assault victimizations of persons age 12 or older in which the offender had, showed, or used a firearm. See appendix table 3 for standard errors.

*Comparison year. Significance testing was conducted for estimates of nonfatal firearm violence only.

†Difference with comparison year is significant at the 95% confidence level.

‡Difference with comparison year is significant at the 90% confidence level.

[a]Includes homicides of persons age 12 or older.

[b]Includes rape or sexual assault, robbery, aggravated assault, and simple assault victimizations. Estimates on rape/sexual assault victimizations involving firearms are not shown separately due to small sample sizes.

[c]Includes rape or sexual assault, robbery, and aggravated assault victimizations. This category was called serious violence in previous years. Estimates on rape/sexual assault victimizations involving firearms are not shown separately due to small sample sizes.

[d]Homicides due to the events of September 11, 2001 are included in total number of homicides.

[e]For information on changes to the 2006 National Crime Victimization Survey that impacted trends in nonfatal violence, see *Criminal Victimization, 2007* (NCJ 224390, BJS, December 2008).

Source: Bureau of Justice Statistics, National Crime Victimization Survey, 1993–2018; and Centers for Disease Control and Prevention, National Center for Injury Prevention and Control, Web-based Injury Statistics Query and Reporting System Fatal Injury Reports developed from the National Vital Statistics System, 1993–2018.

From 1993 to 2018, most firearm violence involved handguns

In 2018, an estimated 7,600 firearm homicides were committed with a handgun, down from 14,000 in 1993 **(table 4)**. The percentage of all firearm homicides that were committed with a handgun decreased as well, from 82% in 1993 to 64% in 2018. The trend was also consistent for firearm homicides against persons age 12 or older.

As was the case for firearm homicides, handguns were involved in the majority of nonfatal firearm violence between 1993–95 and 2016–18 **(table 5)**. Though the average number of nonfatal firearm victimizations involving a handgun decreased from 1.3 million in 1993–95 to 432,800 in 2016–18, the percentage of nonfatal firearm victimizations involving a handgun was not statistically different from 1993–95 (89%) to 2016–18 (92%). Other types of firearms, such as shotguns and rifles, accounted for the remainder of both fatal and nonfatal firearm violence during these periods.

TABLE 4
Firearm homicide, by type of firearm, 1993–2018

	All persons[a]				Persons age 12 or older[b]			
	Handgun		Other firearm[c]		Handgun		Other firearm[c]	
Year	Number	Percent	Number	Percent	Number	Percent	Number	Percent
1993	14,000	82.1%	3,100	17.9%	13,900	82.1%	3,000	17.9%
1994	13,500	82.7	2,800	17.3	13,400	82.8	2,800	17.2
1995	12,100	81.9	2,700	18.1	12,000	82.0	2,600	18.0
1996	10,800	81.1	2,500	18.9	10,700	81.2	2,500	18.8
1997	9,800	78.8	2,600	21.2	9,700	78.9	2,600	21.1
1998	8,900	80.4	2,200	19.6	8,800	80.6	2,100	19.4
1999	8,000	78.8	2,200	21.2	7,900	79.0	2,100	21.0
2000	8,000	78.6	2,200	21.4	7,900	78.5	2,200	21.5
2001	7,800	77.9	2,200	22.1	7,700	78.0	2,200	22.0
2002	8,200	75.8	2,600	24.2	8,100	75.9	2,600	24.1
2003	8,900	80.3	2,200	19.7	8,800	80.4	2,100	19.6
2004	8,300	78.0	2,400	22.0	8,300	78.1	2,300	21.9
2005	8,600	75.1	2,800	24.9	8,500	75.3	2,800	24.7
2006	9,100	77.0	2,700	23.0	9,000	77.1	2,700	22.9
2007	8,600	73.6	3,100	26.4	8,500	73.6	3,000	26.4
2008	7,900	71.8	3,100	28.2	7,800	71.7	3,100	28.3
2009	7,400	71.3	3,000	28.7	7,300	71.4	2,900	28.6
2010	6,900	69.6	3,000	30.4	6,900	69.6	3,000	30.4
2011	7,300	73.0	2,700	27.0	7,200	73.2	2,600	26.8
2012	7,500	72.6	2,800	27.4	7,400	72.6	2,800	27.4
2013	6,800	69.1	3,100	30.9	6,800	69.1	3,000	30.9
2014	6,700	69.1	3,000	30.9	6,600	69.1	2,900	30.9
2015	7,700	68.1	3,600	31.9	7,600	68.2	3,600	31.8
2016	8,200	65.0	4,400	35.0	8,200	65.1	4,400	34.9
2017	8,100	64.6	4,400	35.4	8,000	64.7	4,400	35.3
2018	7,600	64.4	4,200	35.6	7,500	64.4	4,100	35.6

Note: Includes murders and nonnegligent manslaughters involving a firearm and the willful killing of one human being by another. Excludes justifiable homicides, nonnegligent manslaughters, and homicides resulting from operations of war and the terrorist attacks of September 11, 2001.
[a]Includes homicides of all persons of known or unknown age.
[b]Includes homicides of persons age 12 or older.
[c]Includes rifle, shotgun, and other types of firearms.
Source: Federal Bureau of Investigation, Supplementary Homicide Reports, 1993–2018.

TABLE 5

Nonfatal firearm victimization, by type of firearm, 1995–2018 (3-year rolling averages)

	Handgun		Other firearm[a]	
Year	Number	Percent	Number	Percent
1995	1,270,300 †	88.8%	150,100 †	10.5%
1996	1,147,600 †	89.1	132,600 †	10.3
1997	941,700 †	85.1 †	156,500 †	14.1 †
1998	843,100 †	85.4 †	138,100 †	14.0 †
1999	715,100 †	85.8 †	111,900 †	13.4 †
2000	617,400 †	88.8	75,100 ‡	10.8
2001	530,500	87.7	61,800	10.2
2002	492,100	86.2 ‡	67,800	11.9 ‡
2003	450,800	86.1 ‡	53,700	10.3
2004	415,500	85.2 †	59,500	12.2 ‡
2005	410,100	86.2 ‡	49,000	10.3
2006[b]	456,300	87.0 ‡	55,800	10.6
2007[b]	488,800	87.7	57,100	10.2
2008[b]	449,700	87.6	56,600	11.0
2009	389,700	87.5	50,400	11.3
2010	364,600	91.4	30,700	7.7
2011	382,400	88.7	45,300	10.5
2012	400,200	89.4	46,300	10.3
2013	365,000	86.8	51,600	12.3 ‡
2014	382,200	91.0	31,200	7.4
2015	325,800	90.2	29,000	8.0
2016	369,900	89.7	38,000	9.2
2017	370,100	90.4	37,900	9.3
2018*	432,800	91.8	35,200	7.5

Note: Includes rape or sexual assault, robbery, and aggravated assault victimizations of persons age 12 or older in which the offender had, showed, or used a firearm. Based on 3-year rolling averages, with the most recent year shown (e.g., 1993–95 is shown as 1995). See appendix table 4 for standard errors.

*Comparison year.

†Difference with comparison year is significant at the 95% confidence level.

‡Difference with comparison year is significant at the 90% confidence level.

[a]Includes rifle, shotgun, and other types of firearms. Also includes a small percentage of unknown firearm types.

[b]For information on changes to the 2006 National Crime Victimization Survey that impacted trends in nonfatal violence, see *Criminal Victimization, 2007* (NCJ 224390, BJS, December 2008).

Source: Bureau of Justice Statistics, National Crime Victimization Survey, 1993–2018.

Patterns in firearm homicide and nonfatal firearm violence

Males were victims of fatal and nonfatal firearm violence at higher rates than females during 2014–18

During 2014–18, an average of 13,200 firearm homicides occurred annually **(table 6)**. The overall rate of firearm homicide was 4.8 per 100,000 persons age 12 or older. The firearm homicide rate was higher for males (8.3 per 100,000 males) than females (1.5 per 100,000 females). Based on rates among population groups, the firearm homicide rate was higher for black persons (22.0 per 100,000) than white (1.8 per 100,000), Hispanic (4.6 per 100,000), Asian or Pacific Islander (1.2 per 100,000), and American Indian or Alaska Native (6.2 per 100,000) persons. The rate was also higher for persons ages 18 to 24 (11.6 per 100,000) than for persons in all other age groups.

The rate of nonfatal firearm violence was 1.6 victimizations per 1,000 persons age 12 or older during 2014–18 **(table 7)**. Patterns of nonfatal firearm violence by victim characteristics were generally similar to those for firearm homicides. Males were victims of nonfatal firearm violence at a higher rate (2.0 per 1,000) than females (1.2 per 1,000), and black persons were victims (2.7 per 1,000) at a higher rate than white (1.3 per 1,000) and Asian persons (0.9 per 1,000). The rate of nonfatal firearm violence was higher for persons ages 18 to 24 (3.8 per 1,000) than for persons in all other age groups.

TABLE 6
Firearm homicide against persons age 12 or older, by victim characteristics, 2014–18

Victim characteristic	Average annual number of homicides	Rate per 100,000 in each category
Total	13,200	4.8
Sex		
Male	11,200	8.3
Female	2,000	1.5
Race/ethnicity		
White*	3,200	1.8
Black*	7,600	22.0
Hispanic	2,100	4.6
Asian/Native Hawaiian/ Other Pacific Islander*	200	1.2
American Indian/ Alaska Native*	100	6.2
Age		
12–17	700	2.7
18–24	3,600	11.6
25–34	4,100	9.3
35–49	3,100	5.0
50 or older	1,700	1.5

Note: Includes fatal injuries involving a firearm inflicted on persons age 12 or older by another person with intent to injure or kill by any means. Includes homicides due to the events of September 11, 2001. Excludes homicides due to legal intervention and operations of war. Details may not sum to totals due to rounding and some categories not being shown. See appendix table 5 for population estimates.

*Excludes persons of Hispanic origin (e.g., "white" refers to non-Hispanic whites and "black" refers to non-Hispanic blacks).

Source: Centers for Disease Control and Prevention, National Center for Injury Prevention and Control, Web-based Injury Statistics Query and Reporting System Fatal Injury Reports developed from the National Vital Statistics, 2014–18.

TABLE 7
Nonfatal firearm victimization against persons age 12 or older, by victim characteristics, 2014–18

Victim characteristic	Average annual number of victimizations	Rate per 1,000 in each category
Total	432,900	1.6
Sex		
Male*	262,300	2.0
Female	170,600 ‡	1.2 †
Race/ethnicity		
White[a]	225,600 †	1.3 †
Black[a]*	88,500	2.7
Hispanic	86,300	1.9
Asian[a]	14,400 !	0.9 †
Other[a,b]	18,200 !	3.1
Age		
12–17	25,000 †	1.0 †
18–24*	113,800	3.8
25–34	90,200	2.0 †
35–49	118,900	1.9 †
50 or older	85,100	0.8 †

Note: Includes rape or sexual assault, robbery, and aggravated assault victimizations of persons age 12 or older in which the offender had, showed, or used a firearm. Details may not sum to totals due to rounding and some categories not being shown. See appendix table 6 for population estimates and standard errors.

*Comparison group.

†Difference with comparison group is significant at the 95% confidence level.

‡Difference with comparison group is significant at the 90% confidence level.

! Interpret with caution. Estimate is based on 10 or fewer sample cases, or coefficient of variation is greater than 50%.

[a]Excludes persons of Hispanic origin (e.g., "white" refers to non-Hispanic whites and "black" refers to non-Hispanic blacks).

[b]Includes Native Hawaiians or Other Pacific Islanders, American Indians or Alaska Natives, and persons of two or more races.

Source: Bureau of Justice Statistics, National Crime Victimization Survey, 2014–18.

Measures and definitions of race and ethnicity

In the National Crime Victimization Survey (NCVS), the Bureau of Justice Statistics (BJS) uses race and ethnicity categories for data collection as specified by the Office of Management and Budget's Standards for Maintaining, Collecting, and Presenting Federal Data on Race and Ethnicity. The standards have five categories for data on race: American Indian or Alaska Native, Asian, Black or African American, Native Hawaiian or Other Pacific Islander, and White. There are two categories for data on ethnicity: Hispanic or Latino, and Not Hispanic or Latino.

Given that NCVS data are derived from surveyed respondents, the relatively small sizes of certain population groups compared to the overall U.S. population can pose measurement difficulties. In addition, the relatively infrequent occurrence of crime types such as firearm victimization in the population can compound these measurement challenges. These issues often lead to even smaller sample sizes for particular demographic groups, including persons who are American Indian, Alaska Native, Native Hawaiian, Other Pacific Islander, or Asian. In accordance with standard statistical analysis methodology for reporting estimates from sample data, BJS may combine categories into an "Other" group to generate valid and reliable estimates or to protect the identity of individuals.

In this report, NCVS estimates for specific race and ethnicity groups are shown for different years based on data availability and measures of reliability. Some differences between these estimates that may seem substantial may not be statistically significant, due to the larger standard errors that typically result from smaller sample sizes. (See *Measurement of crime in the NCVS* in *Methodology*.)

During 2014–18, strangers committed a greater percentage of nonfatal firearm violence than nonstrangers

During 2014–18, the victim-offender relationship and number of offenders were known in 1.9 million victimizations involving nonfatal firearm violence **(table 8)**. Strangers committed a greater percentage of nonfatal firearm violence (60%) than known offenders (40%).[2] Friends or acquaintances committed a greater percentage of nonfatal firearm violence (25%) than intimate partners (9%) and other relatives (7%).

In comparison, strangers committed 39% of the 7.3 million nonfirearm violent victimizations during 2014–18, while known persons committed 61%. Similar to nonfatal firearm violence, friends and acquaintances (35%) committed a greater percentage of nonfirearm violence than intimate partners (18%) and other relatives (8%). Intimate partners committed a greater percentage of nonfirearm violence than other relatives.

[2]Known offenders include persons known to the victim, such as current or former intimate partners, other relatives, and friends or acquaintances.

TABLE 8
Nonfatal violence excluding simple assault, by presence of firearm and victim-offender relationship, 2014–18

	Total[a]		Firearm violence[b]		Nonfirearm violence[c]	
Victim-offender relationship	Number	Percent	Number	Percent	Number	Percent
Any	9,179,700	100%	1,907,300	100%	7,272,400	100%
Nonstranger	5,211,900 †	56.8% †	768,800 †	40.3% †	4,443,100 †	61.1% †
Intimate[d]	1,517,800 †	16.5 †	175,300 †	9.2 †	1,342,600 †	18.5 †
Other relative	716,600 †	7.8 †	125,900 †	6.6 †	590,700 †	8.1 †
Friend/acquaintance	2,977,500 †	32.4 †	467,600 †	24.5 †	2,509,800	34.5 ‡
Stranger*	3,967,800	43.2%	1,138,500	59.7%	2,829,300	38.9%

Note: Includes victimizations in which the victim-offender relationship was known. The victim-offender relationship and number of offenders were unknown in 8% of total violence, 12% of firearm violence, and 8% of nonfirearm violence. Details may not sum to totals due to rounding. See appendix table 7 for standard errors.

*Comparison group.

†Difference with comparison group is significant at the 95% confidence level.

‡Difference with comparison group is significant at the 90% confidence level.

[a]Includes rape or sexual assault, robbery, and aggravated assault victimizations of persons age 12 or older.

[b]Includes victimizations in which the offender had, showed, or used a firearm.

[c]Includes victimizations in which the offender did not have, show, or use a firearm.

[d]Includes victimizations by current or former spouses, boyfriends, and girlfriends.

Source: Bureau of Justice Statistics, National Crime Victimization Survey, 2014–18.

About 40% of nonfatal firearm violence occurred in or near the victim's home during 2014–18

During 2014–18, there were 2.2 million nonfatal firearm victimizations **(table 9)**. About 40% of all nonfatal violence excluding simple assault occurred in or near the victim's home, whether it involved a firearm or not. A greater percentage of nonfatal violence involving a firearm (21%) than nonfirearm violence (13%) occurred near the victim's home. However, a greater percentage of nonfirearm violence (29%) than firearm violence (17%) occurred in the victim's home. Meanwhile, a greater percentage of nonfatal violence involving a firearm (11%) than nonfirearm violence (6%) occurred in a parking lot or garage.

TABLE 9
Nonfatal violence excluding simple assault, by presence of firearm and location of crime, 2014–18

	Total[a]		Firearm violence[b]*		Nonfirearm violence[c]	
Location	Number	Percent	Number	Percent	Number	Percent
Any	10,032,400	100%	2,164,700	100%	7,867,600 †	100%
Victim's home/lodging	2,660,200	26.5	372,600	17.2	2,287,600 †	29.1 †
Near victim's home	1,495,400	14.9	453,800	21.0	1,041,500 †	13.2 †
In, at, or near friend's/neighbor's/ relative's home	1,009,000	10.1	218,500	10.1	790,500 †	10.0
Commercial place	811,200	8.1	189,300	8.7	621,900 †	7.9
Parking lot/garage	704,700	7.0	239,600	11.1	465,000 †	5.9 †
School[d]	611,300	6.1	33,700 !	1.6 !	577,600	7.3
Open area/on street/ public transportation	1,877,200	18.7	503,400	23.3	1,373,900 †	17.5 †
Other location	863,400	8.6	153,800	7.1	709,600 †	9.0

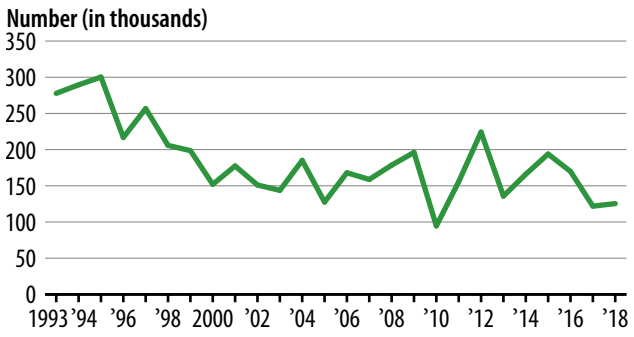
Note: Details may not sum to totals due to rounding. See appendix table 8 for standard errors.
*Comparison group.
†Difference with comparison group is significant at the 95% confidence level.
! Interpret with caution. Estimate is based on 10 or fewer sample cases, or coefficient of variation is greater than 50%.
[a]Includes rape or sexual assault, robbery, and aggravated assault victimizations of persons age 12 or older.
[b]Includes victimizations in which the offender had, showed, or used a firearm.
[c]Includes victimizations in which the offender did not have, show, or use a firearm.
[d]Inside a school building or on school property.
Source: Bureau of Justice Statistics, National Crime Victimization Survey, 2014–18.

About 125,400 victimizations involved the theft of a firearm in 2018

Violent and property victimizations involving the theft of at least one firearm declined from 277,700 in 1993 to 125,400 in 2018 **(figure 3)**. The number of victimizations involving the theft of items excluding firearms decreased during this period, from 32.3 million to 12.2 million (not shown). In addition, an annual average of 1% of all theft victimizations from 1993 to 2018 involved the theft of firearms (not shown).

From 2014 to 2018, about 777,100 victimizations (an annual average of 155,400) involved the theft of at least one firearm. About 1.2 million firearms (an annual average of 249,400) were stolen during violent, property, and personal larceny victimizations during this five-year period (not shown).

FIGURE 3
Nonfatal victimizations involving the theft of a firearm, 1993–2018



Note: See appendix table 9 for estimates and standard errors.
Source: Bureau of Justice Statistics, National Crime Victimization Survey, 1993–2018.

During 2014–18, about 16% of nonfatal firearm victimizations resulted in physical injury

In 9% of all nonfatal firearm violence during 2014–18, the offender actually fired the weapon (not shown). In 23% of these victimizations, the victim suffered a gunshot wound (not shown). A total of 16% of nonfatal firearm victimizations resulted in physical injury **(table 10)**.[3] About 5% of nonfatal firearm victimizations resulted in serious injury (e.g., gunshot wounds, broken bones, or internal injuries), while 11% resulted in minor injury (e.g., bruises or cuts). Victims received medical treatment in 47% of these victimizations. Among the victimizations in which victims received treatment, 78% did so in a hospital or doctor's office.

Overall, victims were more likely to suffer physical injury in nonfatal violence without a firearm (40%) than in firearm victimizations (16%). This pattern also held for victimizations involving serious injury and minor injury. There was no statistically significant difference between the percentage of victims who received treatment for injuries from firearm (47%) and nonfirearm violence (46%).

[3]Victims hospitalized for an extended period due to injury may not have been present for their scheduled NCVS household interview and thus may not have been captured by the survey. This could affect the percentages of victims reporting injury and treatment in the NCVS.

TABLE 10

Nonfatal violence excluding simple assault, by presence of firearm, injury, and treatment received, 2014–18

	Total[a]		Firearm violence[b]*		Nonfirearm violence[c]	
Injury and treatment	Number	Percent	Number	Percent	Number	Percent
Any	10,032,400	100%	2,164,700	100%	7,867,600 †	100%
Not injured	6,542,100	65.2%	1,822,100	84.2%	4,720,000 †	60.0% †
Injured	3,490,300	34.8%	342,600	15.8%	3,147,600 †	40.0% †
Serious injuries[d]	1,871,800	18.7	110,100	5.1	1,761,700 †	22.4 †
Gunshot	42,400	0.4	42,400	2.0	~	~
Minor injuries[e]	1,613,900	16.1	232,500	10.7	1,381,400 †	17.6 †
Treatment for injury[f]	3,490,300	100	342,600	100	3,147,600 †	100
No treatment	1,815,700	52.0	173,600	50.7	1,642,100 †	52.2 †
Any treatment	1,616,800	46.3	162,300	47.4	1,454,500 †	46.2
Treatment setting[g]	1,616,800	100	162,300	100	1,454,500 †	100
Medical facility[h]	1,064,400	65.8	125,900	77.6	938,500 †	64.5 ‡
Nonmedical location[i]	552,400	34.2	36,400	22.4	516,000 †	35.5

Note: Details may not sum to totals due to rounding and because data on unknown injury type and unknown treatment are not shown. See appendix table 10 for standard errors.

*Comparison group.

†Difference with comparison group is significant at the 95% confidence level.

‡Difference with comparison group is significant at the 90% confidence level.

~Not applicable.

[a]Includes rape or sexual assault, robbery, and aggravated assault victimizations of persons age 12 or older.

[b]Includes victimizations in which the offender had, showed, or used a firearm.

[c]Includes victimizations in which the offender did not have, show, or use a firearm.

[d]Includes gunshot wounds, knife wounds, sexual violence injuries, internal injuries, unconsciousness, and broken bones.

[e]Includes bruises, cuts, and other minor injuries.

[f]Includes only victims who were injured.

[g]Includes only victims who were injured and received treatment.

[h]Includes doctor's office, hospital emergency room, and overnight at a hospital.

[i]Includes at the scene, at the victim's/friend's/neighbor's home, or at another location.

Source: Bureau of Justice Statistics, National Crime Victimization Survey, 2014–18.

Nearly 70% of nonfatal firearm violence during 2014–18 was reported to police

During 2014–18, nonfatal firearm violence (68%) was more likely to be reported to police than nonfirearm violence (49%) **(table 11)**. For firearm victimizations that were not reported to police, the most common reason victims gave was a belief that police could not or would not do anything to help (32%). The most common reason victims of nonfirearm violence gave for not reporting to police was that they had dealt with the victimization another way, such as reporting to another official, like a guard, manager, or school official (28%).

Victims of firearm violence (32%) were more likely than victims of nonfirearm violence (20%) to not report to police because they believed the police could not or would not do anything to help. Similarly, victims of firearm violence (15%) were more likely than victims of nonfirearm violence (8%) to fear reprisal for reporting.

TABLE 11

Nonfatal violence excluding simple assault, by presence of firearm, reporting to police, and reason for not reporting, 2014–18

	Total[a]		Firearm violence[b]*		Nonfirearm violence[c]	
Reporting to police	Number	Percent	Number	Percent	Number	Percent
Total	10,032,400	100%	2,164,700	100%	7,867,600 †	100%
Reported	5,303,600	52.9%	1,479,200	68.3%	3,824,400 †	48.6% †
Not reported	4,579,000	45.6%	661,300	30.5%	3,917,700 †	49.8% †
Reason not reported[d]	4,579,000	100	661,300	100	3,917,700 †	100
Dealt with it another way[e]	1,250,700	27.3	139,800	21.1	1,110,900 †	28.4 ‡
Not important enough to respondent[f]	682,000	14.9	68,800	10.4	613,300 †	15.7
Police could/would not do anything to help[g]	1,007,200	22.0	212,400	32.1	794,900 †	20.3 †
Fear of reprisal	393,000	8.6	97,200	14.7	295,900 †	7.6 †
Did not want to get offender in trouble with law/advised not to report	333,800	7.3	32,800	5.0	301,000 †	7.7
Other/unknown/no single most important reason[h]	912,200	19.9	110,300	16.7	801,800 †	20.5

Note: Details may not sum to totals due to rounding and missing data on reporting to police, which occurred in about 1% of all victimizations. See appendix table 11 for standard errors. The National Crime Victimization Survey asks respondents about 19 potential reasons for not reporting a victimization to police. For ease of presentation, those data are collapsed into the six categories presented here.

*Comparison group.

†Difference with comparison group is significant at the 95% confidence level.

‡Difference with comparison group is significant at the 90% confidence level.

[a]Includes rape or sexual assault, robbery, and aggravated assault victimizations of persons age 12 or older.

[b]Includes victimizations in which the offender had, showed, or used a firearm.

[c]Includes victimizations in which the offender did not have, show, or use a firearm.

[d]The most important reason stated by the victim.

[e]Includes crime reported to another official (e.g., guard, apartment manager, or school official) or victims who took care of it themselves or informally.

[f]Includes victims who said it was a minor or unsuccessful crime, the offender(s) was a child, it was not clear the incident was criminal or that harm was intended, or insurance would not cover the losses.

[g]Includes victims who indicated they did not find out about the crime until too late, they could not find or identify the offender, they lacked proof of the incident, they thought police would not think it was important enough, they believed police would be inefficient or ineffective, they thought police would cause trouble for the victim, or the offender was a police officer.

[h]Includes victims who indicated they did not want to or could not take time to report, provided some other reason for not reporting, said no one reason was more important than another, or had unknown reasons for not reporting.

Source: Bureau of Justice Statistics, National Crime Victimization Survey, 2014–18.

A firearm was used for self-defense in 2% of nonfatal violent victimizations

The NCVS collects data on victims' reactions and any actions they may have taken during the incident. During 2014–18, the victim took no action against the offender or kept still in 37% of all nonfatal violence excluding simple assault **(table 12)**. Other self-protective behaviors included noncombative tactics (31%) (such as yelling, running away, or trying to attract attention) and threatening or attacking the offender without a weapon (25%). Victims used a firearm to threaten or attack the offender in 2% (166,900) of all nonfatal violent victimizations; the offender had a firearm in 28% of these cases (not shown).

In 1% (183,300) of property victimizations during which the victim was present, the victim threatened or attacked the offender with a firearm. However, the victim was not present during the majority (82%) of property crimes captured by the NCVS.

TABLE 12
Self-protective behaviors of victims, by type of crime, 2014–18

	Nonfatal violence excluding simple assault[a]		Property victimization	
Self-protective behavior	Number	Percent	Number	Percent[b]
Total	10,032,400	100%	72,557,900	100%
Victim was present[c]	10,032,400	100%	12,782,100	17.6%
Took no action/kept still*	3,721,300	37.1	9,032,700	70.7
Threatened/attacked with a firearm	166,900 †	1.7 †	183,300 †	1.4 †
Threatened/attacked with other weapon	184,700 †	1.8 †	31,100 †	0.2 †
Threatened/attacked without a weapon	2,477,200 †	24.7 †	417,700 †	3.3 †
Noncombative tactics[d]	3,129,300 ‡	31.2 †	1,495,700 †	11.7 †
Other	336,100 †	3.4 †	256,900 †	2.0 †
Unknown	16,800 !	0.2 !	1,364,700 †	10.7 †
Victim was not present[c]	~	~	59,775,800	82.4%

Note: Details may not sum to totals due to rounding. See appendix table 12 for standard errors.
*Comparison group.
†Difference with comparison group is significant at the 95% confidence level.
‡Difference with comparison group is significant at the 90% confidence level.
~Not applicable.
! Interpret with caution. Estimate is based on 10 or fewer sample cases, or coefficient of variation is greater than 50%.
[a]Includes rape or sexual assault, robbery, and aggravated assault victimizations of persons age 12 or older.
[b]Denominator includes both property victimizations for which the victim was present and those for which the victim was not present.
[c]Victims were, by definition, present during violent victimizations but may not have been during property victimizations.
[d]Includes yelling, cooperating, running away, arguing or reasoning, calling police, or trying to attract attention or warn others.
Source: Bureau of Justice Statistics, National Crime Victimization Survey, 2014–18.

Incidents of nonfatal firearm violence

An incident is a specific criminal act involving one or more victims. Table 13 presents incident-level data to facilitate comparisons between victim and offender characteristics. Offender characteristics in the NCVS are based on victims' perceptions of offenders.[4]

There were 1.9 million incidents of nonfatal violence excluding simple assault—rape or sexual assault, robbery, and aggravated assault—during 2014–18 in which the offender had, showed, or used a firearm **(table 13)**. During 2014–18, the percentage of nonfatal firearm violent incidents involving male victims (61%) was greater than males' share of the population (49%). The opposite was true for females: the percentage of nonfatal firearm violent incidents involving female victims (39%) was smaller than the percentage of the population that was female (51%).

During 2014–18, males represented a higher share of offenders in nonfatal firearm incidents than their share of the U.S. population

As for offenders, the percentage of nonfatal firearm incidents involving males (76%) was greater than the share of males represented in the population during 2014–18. In comparison, the percentage involving female offenders (6%) was smaller than the percentage of females in the population.

[4]Offender characteristics in the NCVS (sex, race, ethnicity, national origin, and age) are based on victims' perceptions of the offenders and are reported at the incident level. The NCVS began collecting expanded race data on offenders in 2012. See *Methodology*.

TABLE 13
Incidents of nonfatal firearm violence, by characteristics of U.S. population, offender, and victim, 2014–18

Characteristic	U.S. population[a]	Number of incidents		Percent of U.S. population[a]*	Percent of incidents		Percent ratio		
		Offender[b]	Victim		Offender[b]	Victim	Offender to victim	Offender to population	Victim to population
Total	1,356,189,700	1,934,800	1,934,800	100%	100%	100%	1.00	1.00	1.00
Sex									
Male	659,928,700	1,469,400	1,178,500	48.7%	75.9% †	60.9% †	1.25	1.56	1.25
Female	696,261,000	108,800	756,300	51.3	5.6 †	39.1 †	0.14	0.11	0.76
Both male and female offenders	~	210,000	~	~	10.9	~	~	~	~
Race/ethnicity									
White[c]	862,426,100	586,700	1,021,200	63.6%	30.3% †	52.8% †	0.57	0.48	0.83
Black[c]	165,512,800	716,300	399,500	12.2	37.0 †	20.6 †	1.79	3.03	1.69
Hispanic	221,674,800	313,400	363,800	16.3	16.2	18.8	0.86	0.99	1.15
Asian[c]	77,629,700	11,200 !	68,100	5.7	0.6 !	3.5	0.16	0.10	0.62
Other[c,d]	28,946,300	101,100	82,200	2.1	5.2 †	4.2	1.23	2.45	1.99
Multiple offenders of various races	~	35,500	~	~	1.8	~	~	~	~
Age									
11 or younger[e]	~	1,800 !	~	~	0.1% !	~	~	~	~
12–17	124,832,500	80,400	104,900	9.2%	4.2 †	5.4% †	0.77	0.45	0.59
18–29	263,440,000	539,700	752,400	19.4	27.9 †	38.9 †	0.72	1.44	2.00
30 or older	967,917,200	725,500	1,077,500	71.4	37.5 †	55.7 †	0.67	0.53	0.78
Multiple offenders of various ages	~	240,100	~	~	12.4	~	~	~	~

Note: An incident is a specific criminal act involving one or more victims. Offender characteristics are based on victims' perceptions of offenders. Includes rape or sexual assault, robbery, and aggravated assault victimizations of persons age 12 or older in which the offender had, showed, or used a firearm. Details may not sum to totals due to rounding and missing data on offender characteristics. See appendix table 13 for standard errors.

*Comparison group.

†Difference with comparison group is significant at the 95% confidence level.

~Not applicable.

! Interpret with caution. Estimate is based on 10 or fewer sample cases, or coefficient of variation is greater than 50%.

[a]Includes persons age 12 or older living in noninstitutionalized residential settings in the U.S.

[b]Includes incidents for which offender characteristics in each category were reported. Offender sex was unknown in 8% of incidents, race or ethnicity in 9% of incidents, and age in 18% of incidents.

[c]Excludes persons of Hispanic origin (e.g., "white" refers to non-Hispanic whites and "black" refers to non-Hispanic blacks).

[d]Includes Native Hawaiians or Other Pacific Islanders, American Indians or Alaska Natives, and persons of two or more races.

[e]The NCVS does not survey victims age 11 or younger, but victims can report an offender age 11 or younger.

Source: Bureau of Justice Statistics, National Crime Victimization Survey, 2014–18.

The share of black persons in nonfatal firearm incidents was higher for both victims and perceived offenders than their share of the population during 2014–18

During 2014–18, the percentage of nonfatal firearm incidents involving white victims (53%) was smaller than the percentage of white persons in the population (64%). In comparison, the percentage of firearm incidents involving black victims (21%) was larger than the percentage of black persons in the population (12%).

For offenders, the percentage of nonfatal firearm incidents during 2014–18 with persons perceived by the victim to be white (30%) was half their share of the population, while the percentage with persons perceived by the victim to be black (37%) was greater than the percentage of black persons in the population. The percentage of firearm incidents involving offenders who were perceived to be Native Hawaiian or Other Pacific Islander, American Indian or Alaska Native, or two or more races (5%) was greater than their combined share of the population (2%).

Nearly twice (1.8 times) as many nonfatal firearm incidents involved black offenders as black victims during 2014–18. In comparison, around half (0.6 times) as many firearm incidents involved white offenders as white victims.

Relative to their portion of the population, persons ages 18 to 29 made up greater percentages of both victims and perceived offenders in nonfatal firearm incidents during 2014–18

During 2014–18, persons age 30 or older made up a smaller share of both victims (56%) and offenders (38%) in nonfatal firearm incidents than their portion of the U.S. population (71%). The percentage of nonfatal firearm incidents involving victims (5%) and offenders (4%) ages 12 to 17 was also smaller than their portion of the population (9%). The percentage of nonfatal firearm incidents involving victims (39%) and offenders (28%) ages 18 to 29 was greater than their share of the population (19%). In 12% of nonfatal firearm incidents, victims reported multiple offenders of various ages.

Persons ages 18 to 29 were 1.4 times more likely to be offenders and twice as likely to be victims than their percentage of the population during 2014–18.

Methodology

Estimates in this report are primarily based on data from the Bureau of Justice Statistics' (BJS) National Crime Victimization Survey (NCVS) and the Fatal Injury Reports developed from the National Vital Statistics System (NVSS) Web-based Injury Statistics Query and Reporting System (WISQARS), a product of the National Center for Health Statistics (NCHS) of the Centers for Disease Control and Prevention (CDC). Additional estimates come from the FBI's Supplementary Homicide Reports (SHR). All comparisons in this report are based either on statistical significance testing of estimates derived from a sample or on an analysis of all records in the contributing source(s). In particular, comparisons based on figure 1; tables 1, 4, and 6; and part of table 3 derive from an analysis of all records in the contributing source(s).

The National Crime Victimization Survey

Survey coverage

The NCVS is an annual BJS data collection carried out by the U.S. Census Bureau. The NCVS is a self-reported survey that is administered annually from January 1 to December 31. Annual NCVS estimates are based on the number and characteristics of crimes that respondents experienced during the prior 6 months, not including the month in which they were interviewed. Therefore, the 2018 survey covers crimes experienced from July 1, 2017, to November 30, 2018, with March 15, 2018, as the middle of the reference period. Crimes are classified by the year of the survey and not by the year of the crime.

The NCVS is administered to persons age 12 or older from a nationally representative sample of U.S. households and collects information on personal and property crimes. Personal crimes include personal larceny (purse snatching and pick pocketing) and nonfatal violent crimes (rape or sexual assault, robbery, aggravated assault, and simple assault). Household property crimes include burglary or trespassing, motor vehicle theft, and other types of theft. The survey collects information on threatened, attempted, and completed crimes. It collects data both on crimes reported and not reported to police. Unless specified otherwise, estimates in this report include threatened, attempted, and completed crimes. In addition to providing annual level and change estimates on criminal victimization, the NCVS is the primary source of information on the nature of criminal victimization incidents.

Survey respondents provide information about themselves, including age, sex, race, ethnicity, marital status, education level, and income and whether they experienced a victimization. For each victimization incident, respondents report information about the offender (including age, sex, race, ethnicity, and victim-offender relationship), characteristics of the crime (including time and place of occurrence, use of weapons, nature of injury, and economic consequences), whether the crime was reported to police, reasons the crime was or was not reported, and victim experiences with the criminal justice system.

Household information, including household-level demographics (e.g., income) and property victimizations committed against the household (e.g., burglary or trespassing), is typically collected from the reference person. The reference person is any responsible adult member of the household who is unlikely to permanently leave the household. Because an owner or renter of the sampled housing unit is normally the most responsible and knowledgeable household member, this person is generally designated as the reference person and household respondent. However, a household respondent does not have to be one of the household members who owns or rents the unit.

In the NCVS, a household is defined as a group of persons who all reside at a sampled address. Persons are considered household members when the sampled address is their usual place of residence at the time of the interview and when they have no primary place of residence elsewhere. Once selected, households remain in the sample for 3½ years, and eligible persons in these households are interviewed every 6 months, either in person or over the phone, for a total of seven interviews.

First interviews are typically conducted in person, with subsequent interviews conducted either in person or by phone. New households rotate into the sample on an ongoing basis to replace outgoing households that have been in the sample for the full 3½-year period. The sample includes persons living in group quarters, such as dormitories, rooming houses, and religious group dwellings, and excludes persons living on military bases or in institutional settings such as correctional or hospital facilities.

Measurement of crime in the National Crime Victimization Survey

BJS presents data from the NCVS on victimization, incident, and prevalence rates. NCVS victimization and incident data are presented in this report. Victimization rates measure the extent to which violent and property victimizations occur in a specified population during a specified time. Victimization numbers show the total number of times that people or households are victimized by crime. For crimes affecting persons, NCVS victimization rates are estimated by dividing the number of victimizations that occur during a specified time (T) by the population at risk for those victimizations and multiplying the rate by 1,000.

$$\text{Victimization rate}_T = \frac{\text{Number of victimizations experienced by a specified population}_T}{\text{Number of unique persons (or households) in the specified population}_T} \times 1{,}000$$

For victimization rates, each victimization represents one person (for personal crimes) or one household (for property crimes) affected by a crime.[5] Every victimization experienced by a person or household during the year is counted. For example, if one person experiences two violent crimes during the year, both are counted in the victimization rate. If one household experiences two property crimes, both are counted in the victimization rate. Victimization estimates are presented in figures 1 through 3 and tables 1 through 12 in this report.

Incident rates are another measure of crime. The number of incidents is the number of specific criminal acts involving one or more victims. If every victimization had one victim, the number of incidents would be the same as the number of victimizations. If there was more than one victim, the incident estimate is adjusted to compensate for the possibility that the incident could be reported several times by multiple victims and thus be overcounted. For example, if two people were robbed during the same incident, this crime would be counted as one incident and two victimizations. Incident estimates are presented in table 13 in this report.

[5]In the NCVS, personal crimes include personal larceny (purse-snatching and pick-pocketing) and violent victimizations (rape or sexual assault, robbery, aggravated assault, and simple assault). Homicide is excluded because the NCVS is based on interviews with victims. Property crimes include burglary, residential trespassing, motor vehicle theft, and other theft.

Nonresponse and weighting adjustments

The 2018 NCVS data file includes interviews from 151,055 households. Overall, 73% of eligible households completed an interview. Each household was interviewed twice during the year. Within participating households, 242,928 persons completed an interview in 2018, representing an 82% response rate among eligible persons from responding households.

Victimizations that occurred outside of the U.S. were excluded from this report. In 2018, less than 1% of the unweighted victimizations occurred outside of the U.S.

Estimates in this report use data from the 1993 to 2018 NCVS data files, which are weighted to produce annual estimates of victimization for persons age 12 or older living in U.S. households. Because the NCVS relies on a sample rather than a census of the entire U.S. population, weights are designed to calibrate sample point estimates to known population totals and to compensate for survey nonresponse and other aspects of the complex sample design.

The NCVS data files include person, household, and incident weights. Person weights provide an estimate of the population represented by each person in the sample. Household weights provide an estimate of the U.S. household population represented by each household in the sample. After proper adjustment, both household and person weights are also typically used to form the denominator in calculations of crime rates. For personal crimes, the incident weight is derived by dividing the person weight of a victim by the total number of persons victimized during an incident, as reported by the respondent. For property crimes measured at the household level, the incident weight and the household weight are the same because the victim of a property crime is considered to be the household as a whole. The incident weight is most frequently used to calculate estimates of offenders' and victims' demographic characteristics.

Victimization weights used in this analysis account for the number of persons present during an incident and for high-frequency repeat victimizations (i.e., series victimizations). Series victimizations are similar in type but occur with such frequency that a victim is unable to recall each individual event or describe each event in detail. Survey procedures allow NCVS interviewers to identify and classify these similar victimizations as series victimizations and to collect detailed information on only the most recent incident in the series.

The weight counts series incidents as the actual number of incidents reported by the victim, up to a maximum of 10 incidents. Doing so produces more reliable estimates of crime levels than counting such victimizations only once, while the cap at 10 minimizes the effect of extreme outliers on rates. According to the 2018 data, series victimizations accounted for 1.5% of all victimizations and 3.8% of all violent victimizations. Additional information on the series enumeration is detailed in *Methods for Counting High-Frequency Repeat Victimizations in the National Crime Victimization Survey* (NCJ 237308, BJS, April 2012).

Standard error computations

When national estimates are derived from a sample, as with the NCVS, caution must be used when comparing one estimate to another or when comparing estimates over time. Although one estimate may be larger than another, estimates based on a sample have some degree of sampling error. The sampling error of an estimate depends on several factors, including the amount of variation in the responses and the size of the sample. When the sampling error around an estimate is taken into account, estimates that appear different may not be statistically different.

One measure of the sampling error associated with an estimate is the standard error. The standard error may vary from one estimate to the next. Generally, an estimate with a small standard error provides a more reliable approximation of the true value than an estimate with a larger standard error. Estimates with relatively large standard errors are associated with less precision and reliability and should be interpreted with caution.

For complex sample designs, there are several methods that can be used to generate standard errors around a point estimate (e.g., numbers, percentages, and rates). In this report, generalized variance function (GVF) parameters were used for variance estimation. The U.S. Census Bureau produces GVF parameters for BJS, which account for aspects of the NCVS's complex sample design and represent the curve fitted to a selection of individual standard errors, using a specialized version of Balanced Repeated Replication based on Fay's method. GVFs express the variance as a function of the expected value of the survey estimate.16 For more information on GVFs, see *National Crime Victimization Survey, 2016 Technical Documentation* (NCJ 251442, BJS, December 2017).

BJS conducted statistical tests to determine whether differences in estimated numbers, percentages, and rates in this report were statistically significant once sampling error was taken into account. Using statistical analysis programs developed specifically for the NCVS, all comparisons in the text were tested for significance. The primary test procedure was the Student's t-statistic, which tests the difference between two sample estimates. Findings described in this report as higher, lower, or different passed a test at either the 0.05 level (95% confidence level) or 0.10 level (90% confidence level) of significance. Figures and tables in this report should be referenced for significance testing results for specific findings. Caution is required when comparing estimates not explicitly discussed in this report.

NCVS estimates and standard errors of the estimates provided in this report may be used to generate a confidence interval around the estimate as a measure of the margin of error. The following example illustrates how standard errors can be used to generate confidence intervals:

> Based on the 2018 NCVS, the nonfatal firearm victimization rate among persons age 12 or older in 2018 was 1.7 victimizations per 1,000 persons. (See table 2.) Using GVFs, BJS determined that the estimated victimization rate has a standard error of 0.24. (See appendix table 2.) A confidence interval around the estimate is generated by multiplying the standard error by ± 1.96 (the t-score of a normal, two-tailed distribution that excludes 2.5% at either end of the distribution). Therefore, the 95% confidence interval around the 1.7 estimate from 2018 is 1.7 ± (0.24 × 1.96) or (1.2 to 2.2). In other words, if BJS used the same sampling method to select different samples and computed an interval estimate for each sample, it would expect the true population parameter (rate of violent victimization) to fall within the interval estimates 95% of the time.

For this report, BJS also calculated a coefficient of variation (CV) for all estimates, representing the ratio of the standard error to the estimate. CVs (not shown in tables) provide another measure of reliability and a means for comparing the precision of estimates across measures with differing levels or metrics.

Collecting data on offender race and ethnicity in the National Crime Victimization Survey

In 2012, BJS changed the manner in which the NCVS collects information about the perceived race of a violent offender. Information on an offender's race

and Hispanic origin is collected from the victim and is based on the victim's perceptions. Prior to 2012, the NCVS offender race categories were white, black or African American, and some other race. In 2012, offender race categories were expanded to align with the Office of Management and Budget's (OMB) standards for measuring race and ethnicity. The race variable now includes categories for Asians, Native Hawaiians or Other Pacific Islanders, American Indians or Alaska Natives, and persons of two or more races. In 2012, the NCVS also began collecting information on whether an offender was of Hispanic origin.

The NCVS collects offender information from victims in the Crime Incident Report (CIR).[6] Offender demographic characteristics are based on victims' perceptions. The section in the CIR on offenders begins with a question about the number of offenders. For violent crime incidents involving a single offender, respondents are asked about the offender's relationship to the victim, demographic characteristics (including sex, race, ethnicity, and age), membership in a street gang, use of alcohol or drugs at the time of the incident, and previous crimes against the respondent or respondent's household.

For violent incidents involving multiple offenders, respondents are asked similar questions, such as whether the offender demographic characteristics applied to all or most of the offenders. Respondents are asked if any of the offenders were Hispanic or Latino, followed by whether they were mostly Hispanic, mostly non-Hispanic, or an equal number of Hispanic and non-Hispanic persons. Respondents were then asked what the race or races were of the offenders. Following OMB standards for measuring race and ethnicity, the offender race categories in the NCVS are white, black or African American, American Indian or Alaska Native, Asian, Native Hawaiian or Other Pacific Islander, and persons of two or more races. Offenders reported as Hispanic are classified as Hispanic, regardless of their reported race.

Revised 2016 data file

For 2016, BJS greatly increased the NCVS sample size to facilitate the ability to produce state-level victimization estimates from the 22 most populous states. At the same time, the sample was adjusted to reflect the U.S. population counts in the 2010 decennial census. These changes resulted in a historically large number of new households and first-time interviews in the first half of 2016 and produced challenges in comparing 2016 results to prior data years.

Working with the U.S. Census Bureau, BJS subsequently devised the methodology that was used to create the revised 2016 NCVS data file and allow for year-to-year comparisons between 2016 and other data years. The result was revised criminal victimization estimates that were nationally representative for 2016 and could be compared with prior and future years. For more information, see *National Crime Victimization Survey revised 2016 estimates* and *Methodology* in *Criminal Victimization, 2016: Revised* (NCJ 252121, BJS, October 2018).

Web-based Injury Statistics Query and Reporting System Fatal Injury Reports

The WISQARS Fatal Injury Reports (WISQARS Fatal) provide mortality data related to injury. The mortality data reported in WISQARS Fatal come from the NVSS death certificate data reported to the NCHS. Data include causes of death reported by attending physicians, medical examiners, and coroners. It also includes demographic information about decedents reported by funeral directors, who obtain that information from family members and other informants. The NCHS collects, compiles, verifies, and prepares these data for release to the public. The information describes what types of injuries are leading causes of deaths, how common they are, and who they affect. These data are intended for a broad audience—the public, media, and public health practitioners, researchers, and officials—to increase their knowledge of injury.

WISQARS Fatal mortality reports provide tables of total numbers of injury-related deaths and death rates per 100,000 persons. The reports list deaths according to cause (mechanism) and intent (manner) of injury by state, sex, race, Hispanic origin, and age groupings. This report features data on homicides by firearm from 1993 to 2018. The injury mortality data were classified based on the tenth revision of the International Classification of Diseases (ICD-10) for 1999 and later years and on the ICD-9 for 1998 and earlier years. A study showed that the comparability for homicide and firearm homicide between the two classification systems was high. Therefore, data are shown from both periods.[7]

[6]For all questions included on the NCVS CIR, see the BJS website.

[7]Anderson, R. N., Miniño, A. M., Hoyert, D. L., & Rosenberg, H. M. (2001). *Comparability of cause of death between ICD-9 and ICD-10: Preliminary estimates* (National Vital Statistics Reports, Vol. 49, No. 2). National Center for Health Statistics. https://www.cdc.gov/nchs/data/nvsr/nvsr49/nvsr49_02.pdf

The FBI's Uniform Crime Reporting Program, Supplementary Homicide Reports

The FBI's Uniform Crime Reporting Program (UCR) Supplementary Homicide Reports (SHR) were the source of information about the type of gun used in firearm homicides. (See table 4.) The SHR provide incident-level information on criminal homicides, including situation type (e.g., number of victims, number of offenders, and whether offenders were known); age, sex, and race of victims and offenders; weapon used; circumstances of the incident; and the victim's relationship to the offender. Local law enforcement agencies participating in the UCR provide these data to the FBI on a monthly basis. Data include murders and nonnegligent manslaughters in the U.S. from January 1993 to December 2018. Negligent manslaughters and justifiable homicides have been eliminated from the data. Based on the SHR, the FBI estimates that 442,911 murders (including nonnegligent manslaughters) were committed from 1993 to 2018. Agencies provided detailed information on 414,784 of these homicide victims. SHR estimates in this report have been revised from those in previously published reports.

About 94% of homicides are included in the SHR. However, adjustments can be made to the weights to correct for missing victim reports. SHR estimates in this report were generated by BJS. Weights have been developed to compensate for the average annual 10% of homicides that were not reported to the SHR. The development of the set of annual weights is a three-step process.

Each year the FBI's annual *Crime in the United States* report presents a national estimate of murder victims in the U.S. and estimates of the number of murder victims in each of the 50 states and the District of Columbia. The first-stage weight uses the FBI's annual estimates of murder victims in each state and the number of murder victims from that state found in the annual SHR database.

Specifically, the first-stage weight for victims in state S in year Y is—

$$\frac{\text{FBI's estimate of murder victims in state } S_{(\text{year } Y)}}{\text{Number of murder victims in the SHR file from state } S_{(\text{year } Y)}}$$

For complete reporting states, this first-stage weight is equal to 1. For partial reporting states, this weight is greater than 1. For states with a first-stage weight greater than 2—that is, the state reported SHR data for fewer than half of the FBI's estimated number of murder victims in the state—the first-stage weight is set to 1.

The second-stage weight uses the FBI's annual national estimates of murder victims in the U.S. and the sum of the first-stage weights for each state. The second-stage weight for victims in all states in year Y is—

$$\frac{\text{FBI's estimate of murder victims in United States}_{(\text{year } Y)}}{\text{Sum of the first-stage weights of all states}_{(\text{year } Y)}}$$

The third step in the process is to calculate the final annual victim-level SHR weight. The final weight used to develop national estimates of the attributes of murder victims is—

$$\text{SHR weight}_{(\text{year } Y)} = (\text{First-stage weight}_{(\text{year } Y)}) \times (\text{Second-stage weight}_{(\text{year } Y)})$$

Conceptually, the first-stage weight uses a state's own reported SHR records to represent all murder victims in that state, as long as at least 50% of the estimated number of murder victims in that state has a record in the SHR. The sum of the first-stage weights then equals the sum of the total number of all murder victims in states with at least 50% SHR coverage and the simple count of those victims from the other reporting states. The second-stage weight is used to inflate the first-stage weights so that the weight derived from the product of the first- and second-stage weights represents all murder victims in that year in the U.S. The difference between the sum of the first-stage weights and the FBI's annual national estimate of murder victims is the unreported murder victims in states with less than 50% SHR coverage and the murder victims in states that report no data to the SHR in that year. The second-stage weight compensates for this difference by assuming that the attributes of the nonreported victims are similar to the attributes of weighted murder victims in that year's SHR database.

The weighting procedure outlined above assumes that the characteristics of unreported homicide incidents are similar to the characteristics of reported incidents. There is no comprehensive way to assess the validity of this assumption. Also, there is one exception to this weighting process: Some states did not report any data in some years. For example, Florida reported no incidents to the SHR for 1988 through 1991 and from 1997 through 2018. However, the annual national weights attempt to compensate for those few instances in which entire states did not report any data. For more information on differences between the two homicide measures used in this report, see *The Nation's Two Measures of Homicide* (NCJ 247060, BJS, July 2014).

APPENDIX TABLE 1

Population estimates for figure 1: Rate of firearm homicide per 100,000 persons, 1993–2018; and for table 1: Firearm homicide, 1993–2018

Year	Number of all persons	Number of persons age 12 or older
1993	259,918,595	213,918,420
1994	263,125,826	216,740,712
1995	266,278,403	219,557,921
1996	269,394,291	222,304,455
1997	272,646,932	225,273,153
1998	275,854,116	228,202,348
1999	279,040,238	231,113,390
2000	282,171,936	234,048,303
2001	284,968,955	236,875,214
2002	287,625,193	239,784,048
2003	290,107,933	242,435,547
2004	292,805,298	245,205,504
2005	295,516,599	247,910,782
2006	298,379,912	250,633,266
2007	301,231,207	253,208,424
2008	304,093,966	255,744,169
2009	306,771,529	258,144,817
2010	308,758,105	259,920,933
2011	311,580,009	262,791,952
2012	313,874,218	265,239,765
2013	316,057,727	267,512,309
2014	318,386,421	269,799,946
2015	320,742,673	272,102,214
2016	323,071,342	274,440,995
2017	325,147,121	276,604,161
2018	327,167,434	278,774,433

Source: Centers for Disease Control and Prevention, National Center for Injury Prevention and Control, Web-based Injury Statistics Query and Reporting System Fatal Injury Reports developed from the National Vital Statistics System, 1993–2018.

APPENDIX TABLE 2

Population estimates and standard errors for figure 2: Rate of nonfatal firearm victimization per 100,000 persons age 12 or older, 1993–2018; and for table 2: Nonfatal firearm victimization against persons age 12 or older, 1993–2018

		Standard error	
Year	Number of persons age 12 or older	Number of victimizations	Rate per 1,000
1993	210,906,904	151,899	0.72
1994	213,135,895	130,233	0.61
1995	215,080,689	109,866	0.51
1996	217,234,276	113,436	0.52
1997	219,839,107	119,587	0.54
1998	221,880,964	98,283	0.44
1999	224,568,370	87,003	0.39
2000	226,804,614	83,909	0.37
2001	229,215,295	73,576	0.32
2002	231,589,263	82,162	0.36
2003	239,305,985	70,340	0.29
2004	241,703,710	62,937	0.26
2005	244,505,295	74,811	0.31
2006	247,233,080	82,561	0.33
2007	250,344,870	80,010	0.32
2008	252,242,523	66,653	0.26
2009	254,105,607	75,355	0.30
2010	255,961,936	72,425	0.28
2011	257,542,238	70,968	0.28
2012	261,996,322	65,925	0.25
2013	264,411,702	63,225	0.24
2014	266,665,162	72,678	0.27
2015	269,526,470	54,750	0.20
2016	272,204,185	64,204	0.24
2017	272,468,482	61,479	0.24
2018	275,325,387	67,155	0.24

Source: Bureau of Justice Statistics, National Crime Victimization Survey, 1993–2018.

APPENDIX TABLE 3

Standard errors for table 3: Percent of fatal and nonfatal violence involving a firearm, by type of crime, 1993–2018

Year	Nonfatal violence	Nonfatal violence excluding simple assault	Robbery	Aggravated assault
Average annual percentage, 1993–2018	0.20%	0.52%	0.80%	0.69%
1993	0.81	1.92	2.84	2.54
1994	0.68	1.72	2.65	2.19
1995	0.65	1.75	2.78	2.17
1996	0.72	1.85	2.80	2.27
1997	0.80	2.03	3.06	2.59
1998	0.74	2.05	2.92	2.53
1999	0.75	1.98	3.15	2.70
2000	0.88	2.32	3.33	3.07
2001	0.89	2.29	4.16	3.03
2002	0.99	2.71	4.07	3.50
2003	0.83	2.35	3.81	3.02
2004	0.85	2.23	3.65	2.87
2005	0.97	2.61	3.79	3.38
2006	0.89	2.12	3.03	2.87
2007	1.02	2.61	3.08	3.46
2008	0.96	2.76	4.31	4.12
2009	1.19	3.02	5.02	3.96
2010	1.29	3.20	4.54	4.02
2011	1.08	2.89	4.36	3.76
2012	0.88	2.54	4.26	3.51
2013	0.93	2.61	3.66	3.67
2014	1.20	2.78	3.97	3.86
2015	1.00	2.51	3.90	4.02
2016	1.06	2.71	4.46	3.58
2017	0.98	2.43	4.19	3.41
2018	0.94	2.26	3.41	3.63

Source: Bureau of Justice Statistics, National Crime Victimization Survey, 1993–2018.

APPENDIX TABLE 4

Standard errors for table 5: Nonfatal firearm victimization, by type of firearm, 1995–2018 (3-year rolling averages)

	Handgun		Other firearm	
Year	Number	Percent	Number	Percent
1995	109,561	1.45%	28,924	1.17%
1996	89,674	1.29	22,843	1.04
1997	86,419	1.69	27,216	1.40
1998	91,714	1.99	28,238	1.64
1999	84,518	2.15	25,627	1.76
2000	73,015	1.97	18,805	1.58
2001	66,985	2.18	17,437	1.67
2002	67,379	2.47	18,928	1.92
2003	61,871	2.48	16,134	1.79
2004	59,009	2.63	17,419	2.04
2005	57,004	2.51	15,651	1.89
2006	52,985	2.06	14,871	1.62
2007	58,988	2.08	14,938	1.57
2008	58,760	2.27	16,114	1.81
2009	62,240	2.78	17,248	2.23
2010	58,700	2.42	12,950	1.90
2011	61,673	2.69	15,870	2.14
2012	58,492	2.39	15,252	1.97
2013	51,439	2.50	15,162	2.06
2014	56,384	2.26	12,217	1.70
2015	45,879	2.23	10,346	1.68
2016	58,228	2.55	14,793	2.07
2017	47,103	2.00	12,111	1.70
2018	58,264	1.98	12,862	1.59

Source: Bureau of Justice Statistics, National Crime Victimization Survey, 1993–2018.

APPENDIX TABLE 5

Population estimates for table 6: Firearm homicide against persons age 12 or older, by victim characteristics, 2014–18

Victim characteristic	Average annual number of persons age 12 or older
Total	274,344,350
Sex	
Male	134,181,193
Female	140,163,157
Race/ethnicity	
White	175,653,313
Black	34,733,897
Hispanic	45,067,551
Asian/Native Hawaiian/ Other Pacific Islander	16,669,360
American Indian/Alaska Native	2,220,229
Age	
12–17	25,004,717
18–24	30,876,228
25–34	44,645,898
35–49	61,525,664
50 or older	112,291,843

Source: Centers for Disease Control and Prevention, National Center for Injury Prevention and Control, Web-based Injury Statistics Query and Reporting System Fatal Injury Reports developed from the National Vital Statistics System, 2014–18.

APPENDIX TABLE 6

Population estimates and standard errors for table 7: Nonfatal firearm victimization against persons age 12 or older, by victim characteristics, 2014–18

Victim characteristic	Average annual number of persons age 12 or older	Standard error	
		Average annual number of victimizations	Rate per 1,000 in each category
Total	271,237,937	60,112	0.13
Sex			
Male	131,985,742	44,113	0.18
Female	139,252,195	34,017	0.13
Race/ethnicity			
White	172,485,218	40,241	0.13
Black	33,102,558	23,107	0.36
Hispanic	44,334,964	22,779	0.27
Asian	15,525,930	8,400	0.26
Other	5,789,268	9,519	0.80
Age			
12–17	24,966,500	11,315	0.23
18–24	30,184,522	26,762	0.47
25–34	44,076,631	23,368	0.28
35–49	61,019,476	27,462	0.24
50 or older	110,990,809	22,599	0.11

Source: Bureau of Justice Statistics, National Crime Victimization Survey, 2014–18.

APPENDIX TABLE 7

Standard errors for table 8: Nonfatal violence excluding simple assault, by presence of firearm and victim-offender relationship, 2014–18

Victim-offender relationship	Total		Firearm violence		Nonfirearm violence	
	Number	Percent	Number	Percent	Number	Percent
Any	453,071	~	156,465	~	386,275	~
Nonstranger	307,727	1.84%	86,467	3.10%	276,098	1.97%
Intimate	134,542	1.22	34,568	1.65	124,124	1.40
Other relative	82,662	0.81	28,404	1.39	73,096	0.91
Friend/acquaintance	210,682	1.64	63,084	2.63	187,872	1.82
Stranger	255,716	1.79%	111,444	3.19%	203,580	1.89%

~Not applicable.

Source: Bureau of Justice Statistics, National Crime Victimization Survey, 2014–18.

APPENDIX TABLE 8

Standard errors for table 9: Nonfatal violence excluding simple assault, by presence of firearm and location of crime, 2014–18

	Total		Firearm violence		Nonfirearm violence	
Location	Number	Percent	Number	Percent	Number	Percent
Any	481,527	~	170,205	~	407,640	~
Victim's home/lodging	195,336	1.47%	54,743	2.14%	176,588	1.66%
Near victim's home	133,229	1.12	61,911	2.34	105,178	1.15
In, at, or near friend's/neighbor's/ relative's home	103,032	0.91	39,475	1.64	88,022	0.99
Commercial place	89,498	0.80	36,206	1.52	75,520	0.87
Parking lot/garage	81,781	0.74	41,749	1.72	62,865	0.74
School	74,706	0.68	13,364	0.61	72,067	0.83
Open area/on street/ public transportation	154,825	1.26	66,071	2.44	126,012	1.32
Other location	93,160	0.83	31,971	1.37	82,145	0.93

~Not applicable.

Source: Bureau of Justice Statistics, National Crime Victimization Survey, 2014–18.

APPENDIX TABLE 9

Estimates and standard errors for figure 3: Nonfatal victimizations involving the theft of a firearm, 1993–2018

Year	Estimate	Standard error
1993	277,700	49,859
1994	289,500	43,265
1995	300,200	43,446
1996	216,700	37,733
1997	256,700	47,389
1998	205,800	37,179
1999	198,600	39,822
2000	152,000	32,551
2001	177,400	34,503
2002	151,100	33,925
2003	143,700	32,001
2004	185,100	35,266
2005	127,500	30,497
2006	168,000	35,373
2007	158,800	31,998
2008	178,500	42,028
2009	196,100	45,921
2010	94,600	26,052
2011	155,700	33,661
2012	224,200	41,845
2013	135,800	33,896
2014	166,000	36,794
2015	193,900	42,595
2016	169,800	32,378
2017	121,900	26,512
2018	125,400	27,777

Source: Bureau of Justice Statistics, National Crime Victimization Survey, 1993–2018.

APPENDIX TABLE 10

Standard errors for table 10: Nonfatal violence excluding simple assault, by presence of firearm, injury, and treatment received, 2014–18

	Total		Firearm violence		Nonfirearm violence	
Injury and treatment	Number	Percent	Number	Percent	Number	Percent
Any	481,527	~	170,205	~	407,640	~
Not injured	359,320	1.74%	151,795	2.32%	287,667	1.93%
Injured	234,485	1.64%	51,977	2.05%	218,708	1.85%
Serious injuries	154,528	1.25	26,254	1.14	148,445	1.49
Gunshot	15,191	0.15	15,191	0.68	~	~
Minor injuries	140,096	1.16	40,990	1.69	126,465	1.33
Treatment for injury	234,485	~	51,977	~	218,708	~
No treatment	151,442	2.57	34,369	6.45	141,706	2.67
Any treatment	140,263	2.54	33,021	6.42	130,821	2.64
Treatment setting	140,263	~	33,021	~	130,821	~
Medical facility	106,672	3.30	28,403	7.56	98,315	3.47
Nonmedical location	70,061	3.16	13,954	7.28	67,109	3.33

~Not applicable.

Source: Bureau of Justice Statistics, National Crime Victimization Survey, 2014–18.

APPENDIX TABLE 11

Standard errors for table 11: Nonfatal violence excluding simple assault, by presence of firearm, reporting to police, and reason for not reporting, 2014–18

	Total		Firearm violence		Nonfirearm violence	
Reporting to police	Number	Percent	Number	Percent	Number	Percent
Total	481,527	~	170,205	~	407,640	~
Reported	311,403	1.79%	132,280	2.91%	249,426	1.93%
Not reported	281,799	1.76%	78,528	2.72%	253,527	1.93%
Reason not reported	281,799	~	78,528	~	253,527	~
Dealt with it another way	118,493	1.97	30,212	3.82	109,678	2.11
Not important enough to respondent	80,093	1.49	19,989	2.76	74,854	1.62
Police could/would not do anything to help	102,918	1.79	38,800	4.46	88,338	1.83
Fear of reprisal	56,593	1.12	24,405	3.25	47,483	1.11
Did not want to get offender in trouble with law/advised not to report	51,145	1.02	13,168	1.90	47,986	1.12
Other/unknown/no single most important reason	96,523	1.71	26,282	3.45	88,834	1.84

~Not applicable.

Source: Bureau of Justice Statistics, National Crime Victimization Survey, 2014–18.

APPENDIX TABLE 12

Standard errors for table 12: Self-protective behaviors of victims, by type of crime, 2014–18

	Nonfatal violence excluding simple assault		Property victimization	
Self-protective behavior	Number	Percent	Number	Percent
Total	481,527	~	870,863	~
Victim was present	481,527	~	321,173	0.39%
Took no action/kept still	244,861	1.67%	262,658	1.03
Threatened/attacked with a firearm	33,571	0.32	31,096	0.24
Threatened/attacked with other weapon	35,675	0.34	12,478	0.10
Threatened/attacked without a weapon	186,236	1.43	47,932	0.37
Noncombative tactics	217,849	1.57	95,320	0.69
Other	51,363	0.49	37,098	0.29
Unknown	9,124	0.09	90,653	0.66
Victim was not present	~	~	782,271	0.43%

~Not applicable.

Source: Bureau of Justice Statistics, National Crime Victimization Survey, 2014–18.

APPENDIX TABLE 13

Standard errors for table 13: Incidents of nonfatal firearm violence, by characteristics of U.S. population, offender, and victim, 2014–18

			Percent of incidents					
			Offender			Victim		
	Number of incidents			95% confidence interval			95% confidence interval	
Characteristic	Offender	Victim	Standard error	Lower bound	Upper bound	Standard error	Lower bound	Upper bound
Total	157,962	157,962	~	~	~	~	~	~
Sex								
Male	131,700	113,983	2.81%	70.44%	81.45%	3.16%	54.72%	67.10%
Female	26,074	85,565	1.27	3.14	8.11	3.06	33.09	45.09
Both male and female offenders	38,536	~	1.78	7.36	14.35	~	~	~
Race/ethnicity								
White	72,784	103,840	2.83%	24.77%	35.88%	3.20%	46.51%	59.05%
Black	82,639	57,172	3.02	31.11	42.94	2.43	15.89	25.40
Hispanic	49,194	53,945	2.17	11.94	20.45	2.33	14.24	23.37
Asian	7,332	19,878	0.38	-0.16	1.32	0.99	1.59	5.45
Other	24,970	22,143	1.22	2.84	7.61	1.09	2.11	6.38
Multiple offenders of various races	13,763	~	0.70	0.47	3.20	~	~	~
Age								
11 or younger	2,788	~	0.14%	-0.19%	0.37%	~	~	~
12–17	21,864	25,512	1.08	2.04	6.27	1.24%	2.98%	7.85%
18–29	69,041	85,284	2.75	22.51	33.28	3.06	32.90	44.88
30 or older	83,315	107,525	3.03	31.56	43.43	3.20	49.43	61.95
Multiple offenders of various ages	41,795	~	1.91	8.67	16.15	~	~	~

~Not applicable.

Source: Bureau of Justice Statistics, National Crime Victimization Survey, 2014–18.

The Bureau of Justice Statistics of the U.S. Department of Justice is the principal federal agency responsible for measuring crime, criminal victimization, criminal offenders, victims of crime, correlates of crime, and the operation of criminal and civil justice systems at the federal, state, tribal, and local levels. BJS collects, analyzes, and disseminates reliable statistics on crime and justice systems in the United States, supports improvements to state and local criminal justice information systems, and participates with national and international organizations to develop and recommend national standards for justice statistics. Doris J. James is the acting director.

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EXHIBIT 55

U.S. Department of Justice
Office of Justice Programs
Bureau of Justice Statistics

Program Report

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The Nation's Two Measures of Homicide

The United States uses two national data collection systems to track detailed information on homicides: the Federal Bureau of Investigation's Supplementary Homicide Reports and the Centers for Disease Control and Prevention's Fatal Injury Reports. Both measures were developed as part of a federal effort to improve national statistical systems in the early twentieth century and have gone through a number of changes since then to improve their consistency and coverage. Each program provides valuable information on the nature, trends, and patterns of homicides in the United States. Although the two measures generally capture information on the same types of events, they are designed for distinct purposes and collect different types of information. In combination, however, they produce a fairly comprehensive understanding of homicide, the most serious form of violence.

Supplementary Homicide Reports

Federal Bureau of Investigation

Supplementary Homicide Reports (SHR) are part of the Uniform Crime Reporting (UCR) Program. UCR data provide important information on crime at the local, state, and national level for law enforcement, policymakers, researchers, and the public. Administered by the Federal Bureau of Investigation (FBI) since 1930, the UCR summary program provides data on the total number of crimes known to law enforcement agencies in the United States. In most states, reports from individual law enforcement agencies are compiled monthly by state-level agencies before being forwarded to the FBI.

The UCR provides aggregate annual counts of the number of homicides occurring in the United States. Beginning in the early 1960s, the FBI began to collect more detailed information on each homicide reported in the UCR aggregate count through the SHR form. The SHR data provide additional details about each homicide incident, including the jurisdiction, month, year, victim and offender demographic characteristics, weapon, the circumstances surrounding the incident (e.g., argument, robbery, gang-related), and the relationship between the victim and offender, if known. The detail provided on each incident permits the examination of specific types of homicides, characteristics surrounding the event, and victim-offender relationships.

The SHR form has two sections: one for all murders and nonnegligent manslaughters (including justifiable homicides) and one for negligent manslaughters. Murder and nonnegligent manslaughter homicides include cases that are suspected to be murders, violence-related manslaughters, law enforcement-related killings, and homicides committed in self-defense. Negligent manslaughter homicides include cases that are determined to be unintentional killings of one person by another (excluding motor vehicle crashes).

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National Vital Statistics System, Fatal Injury Reports

Centers for Disease Control and Prevention

Fatal Injury Reports are developed from the National Vital Statistics System (NVSS), which includes data derived from the registration of births and deaths at the state and local level. The modern system dates back to 1933 when uniform collection and national-level reporting of birth and death certificates began. One public health function of the system is to permit identification of and public response to preventable causes of death.

The NVSS is maintained by the National Center for Health Statistics (NCHS) at the Centers for Disease Control and Prevention (CDC). NVSS data are provided by vital registration systems operated in the various jurisdictions legally responsible for registering vital events—births, deaths, marriages, divorces, and fetal deaths. In the United States, legal authority for registering these events resides individually with the 50 states, 2 cities (Washington, D.C., and New York City), and 5 territories (Puerto Rico, the Virgin Islands, Guam, American Samoa, and the Commonwealth of the Northern Mariana Islands).

The NVSS mortality data are produced from standardized death certificates filed throughout the United States. The death certificate data that the NVSS compiles include decedent age, race, ethnicity, marital status, resident status, educational attainment, residence, cause of death, and the nature of the injuries sustained. The death certificate does not include any information on the suspected perpetrator of a homicide or the victim/offender relationship.

State laws require that a medical examiner or coroner investigate all homicides and other sudden unexpected deaths. In homicide cases, medical examiners and coroners also

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Supplementary Homicide Reports (continued)

SHR data are collected on only those crimes occurring in the United States that come to the attention of law enforcement through citizen reports or observation.[1] The SHR captures deaths by location of offense, and thus includes all homicides occurring in state and local law enforcement jurisdictions. Because the UCR program does not include federal law enforcement agencies, SHR data do not measure homicides occurring in federal prisons, on military bases, and on Indian reservations.[2] The information provided on the SHR form reflects what agencies know based on their initial police investigation and does not reflect subsequent decisions made by prosecutors or courts.

Due to the voluntary nature of the FBI program, a number of law enforcement agencies either do not consistently submit SHR forms to the FBI or do not submit any at all. Historically, between 85% and 90% of all homicides reported in the UCR summary data also have a corresponding SHR form. Homicides reported through the SHR can, however, have missing information about various characteristics of the homicide because the data were not available at the time of submission or not reported by the agency. Approximately 1% of SHR cases are missing victim information, including the victim's age, gender, and race, and approximately 30% of SHR cases have an unknown offender. The proportion of SHR cases that are missing information on the relationship between the victim and the offender has increased from 25% in 1976 to more than 40% since 2000. This is most likely due to the substantial decline in the percentage of homicides cleared since the 1960s, which has produced large numbers of cases with unknown offender information.

The FBI publishes data from the SHR in its annual Crime in the United States series. Preliminary data from the UCR are generally released 6 months after the reference year. SHR data are not included until after the UCR data are finalized, approximately 1 year after the end of the reference year. Online analysis with SHR data can be conducted through a web-based tool maintained by the Office of Juvenile Justice and Delinquency Prevention. Public use data are available from 1976 from the University of Michigan's Inter-University Consortium for Political and Social Research (ICPSR), the FBI's website, and the National Archive of Criminal Justice Data (NACJD).

[1]Territories are not excluded from the SHR collection, but historically have had inconsistent participation in the UCR program.

[2]Although some crimes occurring on tribal lands are reported to the UCR by tribal law enforcement agencies, an unknown proportion of more serious crimes, including homicide, fall under the jurisdiction of federal law enforcement and are not reported to the UCR. Homicides occurring on tribal lands and reported to the UCR by local law enforcement agencies cannot be distinguished from homicides occurring on nontribal lands also under the agency's jurisdiction.

National Vital Statistics System, Fatal Injury Reports (continued)

typically complete the medical part of the death certificate, including manner of death. Funeral directors complete the demographic and other portions through interviews with a member or friend of the family. The death certificates are submitted to state vital statistics offices and forwarded to the National Center for Health Statistics (NCHS). NCHS then classifies each death according to the International Classification of Diseases (ICD). Information on manner of death (e.g., homicide, suicide, unintentional) is combined with information on cause of death to classify deaths using ICD codes, including codes for deaths due to external causes of injury and poisoning.

Each year, a very small number of deaths remain without a manner of death or may be missing from the NVSS. It is believed that the NVSS covers 99% of the birth and death events in the United States. However, there are no published estimates on the coverage of the NVSS with regard to homicide specifically. Each jurisdiction maintains individual vital statistics files and sets its own criteria for closing those files. NCHS closes the national file after all states have submitted their records and all data are coded, classified, and standardized between states. The level of standardization and data review varies across states and may be dependent on state-level and annual variations in the number of deaths with the underlying caused coded as "other ill-defined and unspecified causes of mortality." A small number of death certificates may not be included in the NVSS if they are filed after the NCHS file has closed. Some studies have examined the reliability of NVSS demographic data by comparing it to U.S. Census Bureau data and surveying funeral directors who are responsible for completing demographic information about the decedent. These studies have concluded that fatal injury reports may undercount American Indian and Alaska Native deaths by 20% to 30% and undercount Asian deaths by 11% to 13%. Race misclassification can be more likely depending on the population make up of the jurisdiction and the cause of death.

Data from the NVSS are typically reported according to the victim's place of residence. Data on place of injury are available but not routinely reported in official statistics. Deaths of non-U.S. residents are also collected but typically not included in official statistics.

Fatal Injury Reports are published annually and are available for public use from the CDC website as part of the NVSS. Preliminary data are generally released approximately 2 years after the end of the reference year. The site provides online analysis tools and customized tables, as well as annual mortality files for download. Publicly available data files include state-level estimates of fatal injury report data. The CDC regularly publishes additional reports on mortality that include statistics not part of the regular annual reports. These may include special analyses by cause of death, age, and other demographic variables; geographic analyses; and trend analyses.

Comparing the SHR and the NVSS

There is considerable overlap in homicides reported to the SHR and the NVSS (see table). Coroners and medical examiners often work closely with law enforcement on homicide cases. Thus, there is generally agreement on the cause of death and victim information reported to the CDC and the FBI, because cases are investigated and documented through collaborative efforts and then reported through NVSS and SHR.

Both systems follow the same rules in applying homicide labels to incidents and victims; however, each system has different subcategories of homicide, which are well-defined and can be used to identify similar types of homicides in the two systems. For example, the FBI classifies homicides as intentional, justifiable, or negligent. Homicides reported through the NVSS are classified according to the ICD system into two general categories: homicide or legal intervention. Both intentional and negligent homicides are defined as "homicides" in the NVSS, which makes no judgment of criminal intent. The legal intervention deaths in NVSS generally align with the FBI definition of "justifiable homicide," while the single NVSS category of "homicide" includes the SHR's two categories of intentional and negligent homicide. Unlike the SHR, the NVSS homicide classification includes assault by the crashing of a motor vehicle, but this category generally accounts for less than 100 deaths per year.[3]

Both systems have potential issues with data quality, which can affect the information's accuracy and lead to misclassification of death incidents. Data quality may also be affected when records are not submitted in a timely manner or when the cause of death or other information is not updated as more accurate information becomes available.

The NVSS consistently shows a higher number and rate of homicides in the United States compared to the SHR, likely due to the differences in coverage and scope and the voluntary versus mandatory nature of the data collection as described above. Despite these differences, the two sources show similar trends for the rate of homicides over time at the national level (see figure). Greater discrepancies between the two sources exist at the state level. Most states report more homicides through the NVSS than the SHR, yet in some states the opposite is true. Furthermore, the state-level ratio of homicides reported in the NVSS versus the SHR varies over time. State-level variations in reporting may be due to missing data, where cases that fall within the scope of the SHR or NVSS are not reported to the appropriate system. Variations may also be due to true differences between the homicide victim's state of residence, which would be reported to the NVSS, and the state where the homicide incident occurred, as reported to the SHR. These differences may be particularly apparent in state or jurisdiction-level rate calculations based on the resident population. Since the NVSS is based on the residence of the victim, it is considered the more applicable source for resident-based rate calculations, while the SHR is more applicable for jurisdiction-based crime rates.

Unique features of each measure should be considered when using these data. Publicly available SHR datasets provide victim demographic information at the agency level, while NVSS homicide victim demographic estimates are not publicly

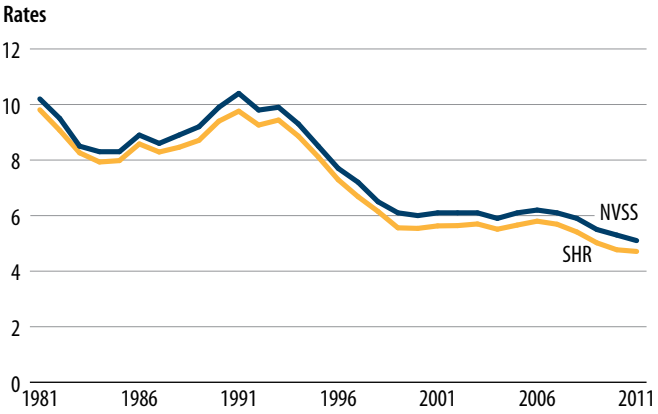
Continued on next page

[3]NVSS fatal injury data are publicly available through the WONDER and WISQARS systems. The WONDER system combines legal intervention deaths and operations of war into the same category. The WISQARS system presents legal intervention deaths only, excluding the small number of operations of war deaths that occur in the United States each year (generally fewer than 25 deaths per year).

Comparing the NVSS fatal injury reports and the UCR supplementary homicide reports

	NVSS	SHR
Purpose	Track all deaths	Track crime statistics
Reporting source	State vital registrars	Law enforcement agencies
Initial report	Death certificate	Police report
Reporting responsibility	Medical examiners and coroners	Law enforcement officers
Homicide definition	Injuries inflicted by another person with intent to injure or kill by any means	Willful killing of one human being by another, includes murders & nonnegligent manslaughters
Reporting is	Mandatory	Voluntary
Data collection methods	Manner/cause of death determined by medical examiners/coroners; demographic information is recorded by funeral directors on death certificates	In most states, reports from individual law enforcement agencies are compiled monthly by state-level agencies and then forwarded to the FBI

Homicide rates in the NVSS and SHR, 1981–2011



Note: SHR data include intentional homicides known to law enforcement and exclude justifiable homicides and nonnegligent manslaughter. NVSS data include all homicides committed by civilians (regardless of intent) and exclude homicides due to legal intervention. Both data sources exclude homicides resulting from operations of war and the terrorist attacks of September 11, 2001. Rates are calculated as the number of homicides per 100,000 U.S. residents. SHR rates are weighted to the annual number of homicide victims reported in the FBI's Uniform Crime Reports.

Comparing the SHR and the NVSS (continued)

avaliable.[4] The NVSS will produce more accurate homicide trends at the national level than the SHR, because the NVSS includes deaths that occur in federal jurisdictions and more complete state and local jurisdiction reporting. More complete information on homicide victim characteristics is available through the NVSS. In particular, the NVSS provides more complete information about victim Hispanic origin compared to the SHR and includes measures of victim marital status and educational attainment, which are not found in the SHR. Mass homicide events are included in the NVSS; however, only deaths specifically labeled as a foreign terrorist act by the FBI are identified as such in the NVSS data and can be linked together. To date, this includes only the events of September 11, 2001. The SHR also includes mass homicide events but excludes deaths that occurred on September 11, 2001.

Since the SHR collects information about the offender and incident, SHR data are better suited for understanding the circumstances surrounding homicide incidents, including events leading up to the homicide, characteristics of the offender, and the relationship between the victim and the offender. SHR data are also advantageous for examining certain subtypes of homicides, including police and child homicides. Research on specific types of homicides identified by victim-offender relationship, such as those involving intimate partners, are possible with SHR data, but not with the NVSS data. However, the SHR has high proportions of homicides for which the offender is unknown to law enforcement, particularly for certain victim subgroups. For example, among male victims, the victim-offender releationship is undetermined in about 50% of incidents. Researchers must determine whether the data are appropriate for use and use caution when drawing conclusions about homicide offenders.

The SHR is designed to capture homicides known to law enforcement by jurisdiction, so SHR data can be used for research on homicides based on where they occurred. The NVSS collects data on both where the death occurred and where the victim lived, although homicide rates are typically calculated using place-of-residence data.

A more comprehensive understanding of homicide in the United States can perhaps be achieved by combining the strengths of the two data collection systems.

For more information about the SHR, see *Crime in the United States* available online at http://www.fbi.gov/about-us/cjis/ucr/ucr#ucr_cius; online analysis tool at http://ojjdp.gov/ojstatbb/ezashr/; and downloadable data files from http://www.icpsr.umich.edu/icpsrweb/landing.jsp and http://www.icpsr.umich.edu/icpsrweb/NACJD/.

For more information about mortality data in the NVSS, see http://www.cdc.gov/nchs/deaths.htm; online analysis tools at http://wonder.cdc.gov/ and http://www.cdc.gov/injury/wisqars/fatal.html; and downloadable data files from http://www.cdc.gov/nchs/data_access/Vitalstatsonline.htm.

[4]Users may apply to the CDC to gain access to compressed datasets, which contain selected variables for the full mortality files at the county level.

The Bureau of Justice Statistics of the U.S. Department of Justice is the principal federal agency responsible for measuring crime, criminal victimization, criminal offenders, victims of crime, correlates of crime, and the operation of criminal and civil justice systems at the federal, state, tribal, and local levels. BJS collects, analyzes, and disseminates reliable and valid statistics on crime and justice systems in the United States, supports improvements to state and local criminal justice information systems, and participates with national and international organizations to develop and recommend national standards for justice statistics. William J. Sabol is acting director.

This report was written by Wendy Regoeczi of Cleveland State University and Duren Banks of Research Triangle Institute. Michael Planty and Lynn Langton of BJS, J. Lee Annest and Margaret Warner of the CDC, and Cynthia Barnett-Ryan of the FBI consulted on content. Kyle Shea, BJS Intern, verified the report.

Jill Thomas edited the report. Barbara Quinn produced the report.

July 2014, NCJ 247060

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EXHIBIT 56

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Crime Data
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NIBRS Estimates
Hate Crime
Expanded Homicide Data
Expanded Property Crime
Arrest
Quarterly Uniform Crime

Footnotes

National Incident-Based Reporting System (NIBRS) Details Reported in the United States

Crime Select	Year Select	Include Previous Years
Homicide	2021	Current Year

In **2021**, there were **13,477 homicide** incidents, and **14,655** offenses reported in the United States by **11,794** law enforcement agencies that submitted National Incident-Based Reporting System (NIBRS) data, and covers **64%** of the total population.

HOW THESE NUMBERS ARE CALCULATED

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Expanded Property Crime
Arrest
Quarterly Uniform Crime Report
Law Enforcement Collections

Homicide Offense Characteristics

View by: # %

Type of Weapon Involved by Offense

Sort By: Category

Handgun	5,344
Firearm	4,180
Knife/Cutting Instrument	1,019
Unknown	587
Personal Weapons	506
Rifle	410
Other Firearm	268
Blunt Object	265
Other	220
Handgun (Automatic)	205
Shotgun	152
Firearm (Automatic)	124

Offense Linked to Another Offense

Sort By: Category

Aggravated Assault	1,833
Weapon Law Violations	1,536
Destruction/Damage/Vandalism of Property	483
Robbery	296
Drug/Narcotic Violations	285
Total	5,157

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Law Enforcement Collections

Drugs/Narcotics/Sleeping Pills	118
Asphyxiation	74
Fire/Incendiary Device	71
Rifle (Automatic)	37
Other Firearm (Automatic)	6
Poison	6
Shotgun (Automatic)	1
None	0
Pushed or Thrown Out Window	0
Drowning	0
Strangulation - Include Hanging	0
Unarmed	0
Lethal Cutting Instrument	0
Club/Blackjack/Brass Knuckles	0
Motor Vehicle	0
Explosives	0
Total	13,593

EXHIBIT 57

Effects of Assault Weapon and High-Capacity Magazine Bans on Mass Shootings

Updated January 10, 2023

Summary: Evidence for the effect of assault weapon bans on mass shootings is inconclusive. Evidence that high-capacity magazine bans may decrease mass shootings is limited.

We identified six studies that met our inclusion criteria and estimated the effects of state or federal assault weapon bans on multiple-victim shooting incidents or casualties. Two of these (Klarevas, Conner, and Hemenway, 2019; Webster et al., 2020) contribute new findings to this updated review.[1] Each of these studies used different definitions of *mass shooting*, which we highlight in the following sections.

Gius (2015c) focused on *public mass shootings*, which the author defined as incidents resulting in four or more firearm-related fatalities (excluding the offender), and the shooting occurred in a public place, victims were selected indiscriminately, and the shooting was not related to criminal activity. Using a Poisson model and data from 1982 through 2011, Gius (2015c) tested whether state assault weapon

Key Findings

Assault weapon bans have **uncertain** effects on mass shootings.

Evidence for this relationship is **inconclusive**.

Studies with comparable methodological rigor identified inconsistent evidence for the policy's effect on an outcome, or a single study found only uncertain or suggestive effects. Read more about how we determined the strength of gun policy analysis research.

High-capacity magazine bans may **decrease** mass shootings.

Evidence for this relationship is **limited**.

At least one study meeting our inclusion criteria and not otherwise compromised by noted methodological weaknesses reported a significant effect of the policy

on the outcome, and no studies with equivalent or stronger methods provided contradictory evidence.

bans influence these shooting fatalities or injuries, controlling for the federal assault weapon ban and state-level variation in demographic, socioeconomic, and criminal justice characteristics.[2] Findings showed that *state* assault weapon bans had a statistically significant but smaller effect of reducing mass shooting death rates to 55 percent of what would have been expected without the bans, but results indicated uncertain effects on mass shooting injuries (see the figure below). This report provided little detail describing variation in the timing of the state bans in relation to the federal ban, and it is unclear whether the estimated effects were confounded by correlation between the state and federal bans. The model did not account for serial correlation in panel data, which can result in large biases in standard errors (Aneja, Donohue, and Zhang, 2014).

Luca, Malhotra, and Poliquin (2016) set the same casualty threshold (four or more killed, not including the shooter) and also excluded incidents that occurred in connection with criminal activity, but they did not restrict incidents to public settings and excluded all events with fewer than three fatally injured victims who were not related to the shooter (e.g., family, romantic partner). Using a linear probability model and data from 1989 to 2014, the authors estimated the effects of state assault weapon bans on a binary indicator for whether a mass shooting occurred in a given state-year. In contrast to Gius (2015c), Luca, Malhotra, and Poliquin (2016) did not control for the federal assault weapon ban from 1994 through 2004, but they controlled for a host of other state-level gun policies; state fixed effects; year fixed effects; and state-level demographic, socioeconomic, and political characteristics. Their findings showed uncertain effects of state assault weapon bans on the probability of a mass shooting incident occurring. However, the effects of gun policies on mass shootings were not the primary focus of Luca, Malhotra, and Poliquin (2016), and the authors intended the estimates to serve solely as a robustness check for their main specification (the effects of mass shootings on gun policy). Although the paper provided limited information to use in evaluating the reported statistical models (e.g., on how these policies were coded), it is clear that the analysis used a linear model to predict a rare dichotomous outcome. Therefore, model assumptions were likely violated, making confidence intervals (CIs) unreliable.

Experts Weigh In

ɔare expert opinions on how
that ban assault weapons and
capacity magazines may
t mass shootings in your state
he U.S. as a whole. »

Using data from 1984 to 2017, Webster et al. (2020) again set the same casualty threshold (four or more killed, not including the shooter) and excluded drug- or gang-related shootings; they did not exclude domestic-related incidents, but conducted sensitivity analyses stratified by this characteristic. In negative binomial models including 14 laws, state fixed effects, linear and quadratic time trend terms, and 14 social and economic state covariates, the authors found uncertain evidence that assault weapon bans were associated with mass shooting incidents or deaths. However, they found that states with high-capacity magazine bans had a significant 48-percent reduction in mass shooting incidents, and a suggestive 33-percent reduction in

mass shooting fatalities. Because the number of incidents and fatalities is quite low over this period, maximum likelihood estimates like those used in this study may be biased (Kenne Pagui, Salvan, and Sartori, 2022).

Focusing on high-fatality mass shootings that resulted in six or more firearm fatalities, not including the shooter, Klarevas, Conner, and Hemenway (2019) evaluated the effects of high-capacity magazine restrictions from 1990 to 2017. They used logistic regression for mass shooting incidents and negative binomial models for counts of deaths in models with state fixed effects, a continuous term for year to account for temporal trends, and state-level time-varying covariates. When state and federal restrictions were combined, the authors found that the laws were significantly associated with fewer incidents and deaths in mass shootings generally, and in those that involved a high-capacity magazine specifically. However, the effect sizes reported were improbably large, ranging from reductions of 72 percent of all incidents to 99.7 percent of all deaths. Similarly large point estimates were reported for the effects of state restrictions alone, which were significant for mass shootings involving a high-capacity magazine, and suggestive for the wider set of all mass shootings. There were, however, just 69 high-fatality mass shooting incidents (44 involving a high-capacity magazine) over the entire 27-year study period; with only 69 incidents and 63 estimated parameters, estimated law effects are likely biased because of the sparsity of the outcome (Kenne Pagui, Salvan, and Sartori, 2022).

Blau, Gorry, and Wade (2016) considered a broader set of incidents, including mass public shootings with a minimum of four fatalities occurring during a single incident and perpetrated by a single offender; spree shootings occurring across multiple locations in a public place with a minimum of two fatalities; and active shooter incidents, which involve an individual using a firearm and actively killing or attempting to kill others in a confined space or unconfined and populated area. They used a linear probability model to estimate how a variety of gun laws, including state and federal assault weapon bans, relate to the probability of a public shooting incident occurring based on data covering 1982 to 2013.[3] Controlling for state fixed effects and a linear time trend, as well as for the presence of several other state gun laws and a limited set of state covariates (i.e., population size and aggregated personal income), the authors found that state assault weapon bans were significantly and negatively associated with the likelihood of a public shooting event. However, the use of a linear model to predict a dichotomous (and rare) outcome likely violated model assumptions and rendered the results unreliable. The authors' estimated linear probability model can yield predicted probabilities of active shooting incidence that extend far outside the definitional 0 to 1 range of a probability depending on the particular combination of policies present in a given state. Moreover, the estimated model implies negative IRRs, which represent implausible effect sizes, for some of the gun policies that we are studying.[4] This indicates a serious model misspecification (Cox and Snell, 1989; Aldrich and Nelson, 1984) and prevents us from interpreting the estimated coefficients as causal effect estimates.

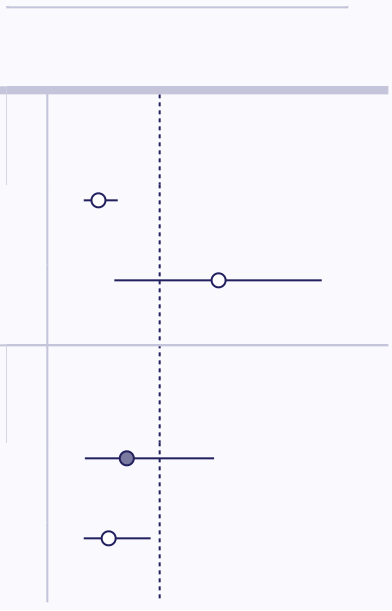
Gius (2018) analyzed school shooting deaths and injuries using data compiled from Klein (2012), Kalesan et al. (2017), and the Everytown for Gun Safety Support Fund. Using a model similar to that in Gius (2015c), this study evaluated whether federal or state assault weapon bans influence school shooting fatalities or injuries, controlling for background check laws, state-level variation in demographic and socioeconomic characteristics, and state-level variation in the ratio of firearm suicides to total suicides as a proxy for variation in gun ownership prevalence. The study showed that the presence of a state or federal assault weapon ban between 1990 and 2014 was significantly associated with a 54-percent reduction in the number of school shooting victims (see the figure below). However, it is unclear the extent to which this estimate was identified from the change in the federal law versus from changes in state policy. Additionally, the author did not appear to make adjustments to standard errors to account for serial correlation in panel data, which may lead to overstated precision of the estimates.

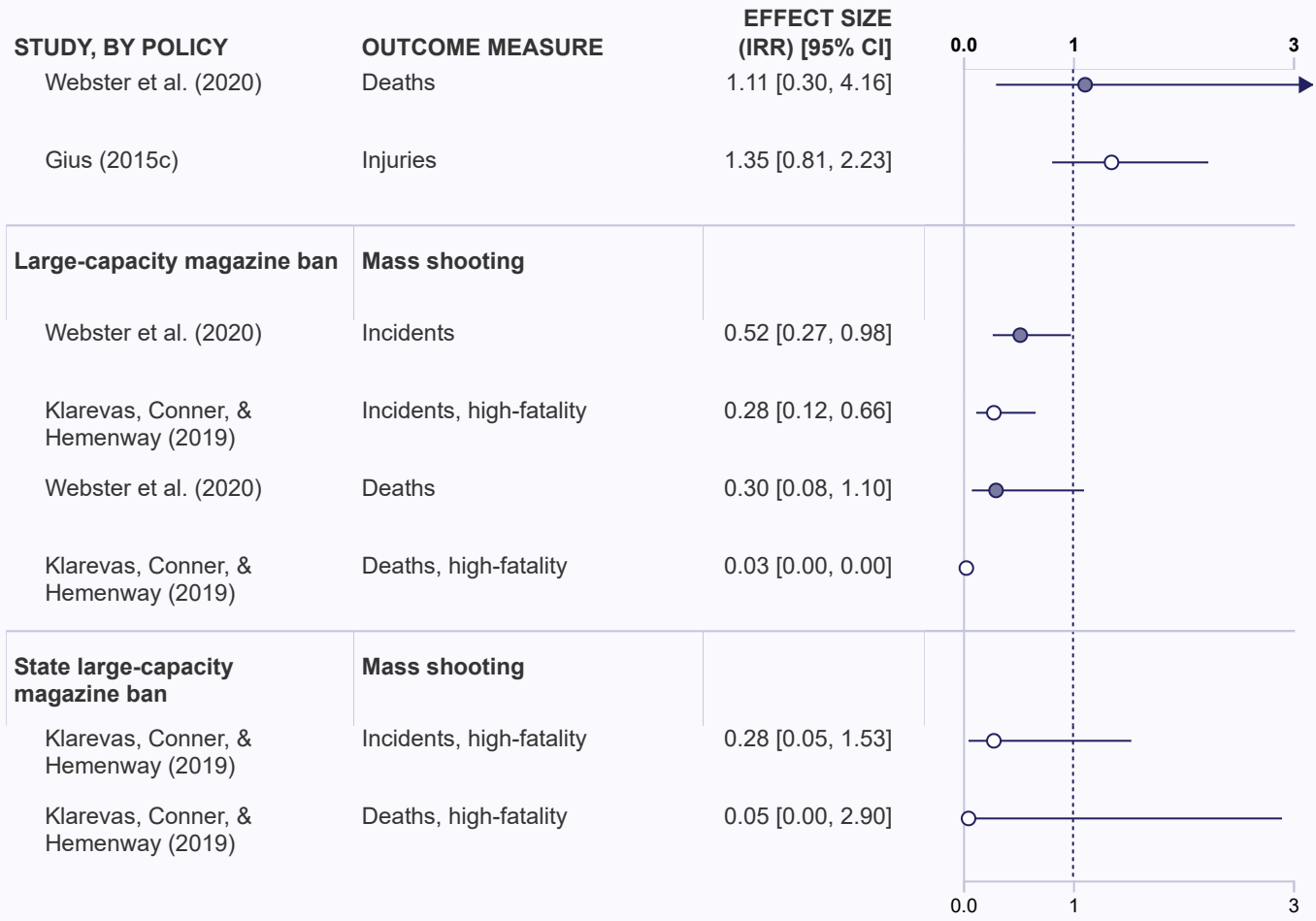
The figure below displays the incidence rate ratios (IRRs) and CIs associated with the assault weapon ban policies examined in these studies. We exclude estimates of the federal assault weapon ban from Gius (2015c) and from Blau, Gorry, and Wade (2016) because they do not meet our criteria for inclusion. We also exclude estimates of effects of state assault weapon bans from Blau, Gorry, and Wade (2016), given the concerns with the study results noted earlier.

Incidence Rate Ratios Associated with the Effect of Assault Weapon Bans on Mass Shootings

HOW TO READ THIS CHART

STUDY, BY POLICY	OUTCOME MEASURE	EFFECT SIZE (IRR) [95% CI]
Assault weapon ban		
Gius (2018)	Number of deaths & injuries from school shootings	0.46 [0.33, 0.63]
Luca, Malhotra, & Poliquin (2016)	Any mass shooting incident	1.52 [0.60, 2.43]
State assault weapons ban	**Mass shooting**	
Webster et al. (2020)	Incidents	0.71 [0.34, 1.48]
Gius (2015c)	Deaths	0.55 [0.33, 0.92]





NOTE: IRR values marked with empty circles indicate that we identified concerns with the study's methodology, and these concerns are described in the text above. Filled circles indicate that we identified no significant methodological concerns. An arrow on either end of a CI indicates that the interval is wider than can be displayed on the scale.

Conclusions

We identified five qualifying studies that estimated the effects of state assault weapon bans on different aspects of mass shootings. Gius (2015c) found that these bans significantly reduce mass shooting deaths but have uncertain effects on injuries resulting from mass shootings. Using similar models, however, Gius (2018) found that assault weapon bans resulted in significantly fewer casualties (deaths and nonfatal injuries) from school shootings. Using a data set similar to that used in Gius (2015c), Luca, Malhotra, and Poliquin (2016) found uncertain effects of state assault weapon bans on the annual incidence of mass shootings. Blau, Gorry, and Wade (2016) found that the bans significantly reduced the annual incidence of mass shootings. Webster et al. (2020) found uncertain evidence of state assault weapon bans on mass shooting incidents and fatalities. Considering our assessment of these findings and the relative strengths of these studies, we find *inconclusive evidence for the effect of assault weapon bans on mass shootings.*

We also identified two studies that examined the effects of high-capacity magazine bans on mass shootings. Webster et al. (2020) found significant or suggestive associations between these state bans and lower rates of mass shooting incidents. Klarevas, Conner, and Hemenway (2019) also found that state-level high-capacity magazine bans were associated with fewer mass shootings and deaths in incidents in which a high-capacity magazine was used, as well as suggestive reductions in all mass shooting incidents and deaths (including those that did not involve a high-capacity magazine). Considering our assessment of these findings and the relative strengths of these studies, we find *limited evidence that high-capacity magazine bans reduce mass shootings.*

Originally published March 2, 2018

BANS ON THE SALE OF ASSAULT WEAPONS AND HIGH-CAPACITY MAGAZINES | MASS SHOOTINGS

Notes

1. We exclude DiMaggio et al. (2019), who studied the federal assault weapon ban, determining that the study does not meet our inclusion criteria because of the absence of a comparison group. Although the authors focus on an outcome defined as the proportion of all firearm homicide deaths that occurred during mass shootings, this is not equivalent to having a comparison group; mass shooting deaths are included in both the numerator and the denominator. Furthermore, the use of firearm homicides as a comparison group has obvious methodological problems, given that the assault weapon ban (as well as other 1994 legislation passed coincident to the assault weapon ban) might be expected to affect firearm homicide rates. ⮌

2. The author found a large and statistically significant association between implementation of the federal assault weapon ban and reductions in mass shooting deaths and injuries. However, because the model included an indicator for years prior to and after the federal ban as a control but there was no comparison group, the analysis of the federal ban does not meet our criteria for inclusion. ⮌

3. The model included an indicator for the period of the federal ban, but because the federal ban applied to all states, there was no comparison group. Thus, the analysis of the federal ban does not meet our criteria for inclusion. ⮌

4. For example, the model coefficient for stand-your-ground laws implies an IRR of –2, with a 95-percent CI that lies entirely in the negative IRR range. ⮌

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EXHIBIT 58

APPLIED ECONOMICS, 2016
http://dx.doi.org/10.1080/00036846.2016.1164821

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Guns, laws and public shootings in the United States

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ABSTRACT

Since the late 1990s, there have been increasing numbers of public shootings carried out with firearms in the United States. These tragedies continually renew the regulatory debate concerning public safety while considering civil liberties. Using a unique data set, we investigate whether laws correspond to whether an event occurs and the effects of event-specific characteristics on public shooting outcomes. In particular, we analyse how state-specific gun laws, the types of firearms, the shooting venues and the mental health of the gunman impact the outcomes of public shootings. Results show that most gun laws are unrelated to whether an event occurs. In addition, common state and federal gun laws that outlaw assault weapons are unrelated to the likelihood of an assault weapon being used during a public shooting event. Moreover, results show that the use of assault weapons is not related to more victims or fatalities than other types of guns. However, the use of hand guns, shot guns and high-capacity magazines is directly related to the number of victims and fatalities in a public shooting event. Finally, the gunman's reported mental illness is often associated with an increase in the number of victims and fatalities.

KEYWORDS

Guns; public shootings; gun control; gun laws

JEL CLASSIFICATION

K10; K40

I. Introduction

Public shootings prompt renewed debates about gun control with calls for legislation and regulations to limit the types and availability of firearms. After the shootings at Sandy Hook Elementary, President Obama vowed to 'use whatever power [his] office holds' to prevent future tragedies.[1] While most people would agree that preventing future tragedies is a worthy goal, policymakers disagree on the best course of action to take in order to achieve this goal. This comes as no surprise since there is little research on what policies or factors affect the outcomes of public shootings. However, given that shooting events are increasing over time (see Figure 1), this type of research is pertinent.

Although changes in gun legislation have been slow to evolve, in 2013 President Obama signed into law the Investigative Assistance for Violent Crimes Act of 2012. The act provided the attorney general the authority to assist in investigations of public shooting events occurring in a place of public use and active shooter events at the request of state law enforcement officials. On 5 January 2016, President Obama proposed an updated strategy to reduce gun violence in America. The strategy focuses on new background check requirements to increase the effectiveness of the National Instant Criminal Background Check System and to enhance the education and enforcement of existing state gun laws.[2] Some policymakers favour expanded gun legislation, such as an assault weapons ban, a limit on high-capacity magazines or expanded background checks. However, little is known about the effect of existing regulations on public shooting outcomes. Others point to mental illness as an explanation for these tragic events. Yet there is little research on how the presence of mental illness influences the outcomes of public shootings. This article addresses these unanswered questions. Indeed, the results from our study have important implications as policymakers move forward to prevent future tragedies.

While gun violence arises out of sociocultural, educational, behavioural and product safety issues which transcend simply gun ownership, gun

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[1]http://www.nytimes.com/2012/12/17/us/politics/bloomberg-urges-obama-to-take-action-on-gun-control.html
[2]http://www.ncsl.org/research/civil-and-criminal-justice/summary-president-obama-gun-proposals.aspx

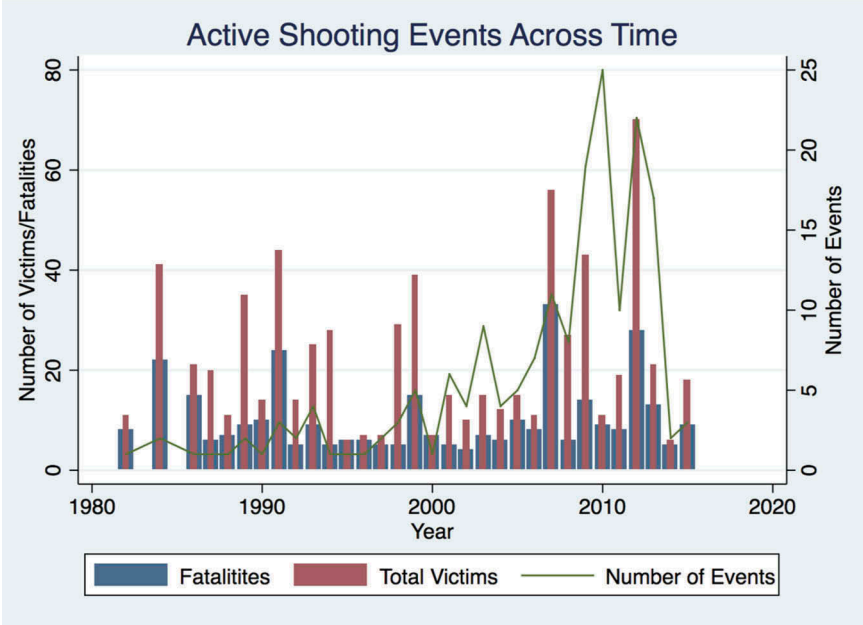

Figure 1. Distribution of events.

violence and, specific to the current analysis, many public shootings are arguably random events. Given the random and uncertain nature of tragic events like Sandy Hook, Aurora, Columbine and most recently at Umpqua Community College in October of 2015, the question arises as to whether or not public policy can have the same impact on a random act of mass violence as public policy has had on other areas of concern (Mozaffarian, Hemenway, and Ludwig 2013).

Policymakers across the political spectrum have variations of opinions on public policy and the impact the regulations or laws would have on the occurrence of these uncertain events. Some policymakers emphasize that a breadth of tougher gun laws would have prevented these random acts of violence or at the very least reduced the severity of the event. Counter to this argument, pro-gun or anti-control policymakers disbelieve gun controls have any preventive efficacy. Other pundits indicate the public shootings could have been prevented or the severity of the event would have been dramatically reduced through site-specific security. Given the breadth of the political debate and public opinion, the question still remains whether gun ownership regulation, gun and ammunition control, background checks and owner education have any effect on the damages caused by public shootings.

In this article, we analyse the outcomes of public shooting events using a unique panel data series of U.S. states from 1982 to 2014. The data include 184 public shootings over the last 31 years. Using these data, we create a state panel over time to test whether gun laws are associated with occurrences of public shootings. We find that most laws have little correlation with whether an event occurs. The one consistent finding is that state assault weapons laws show a negative correlation with active shooter events.

We then look at a cross section of public shootings to test whether gun laws, particularly laws that restrict or regulate weapons that are collectively classified in the National Firearms Act of 1968 (NFA) as assault-type weapons, impact whether assault weapons are used in public shootings. We find that state laws such as the NFA restrictions, as well as the federal assault weapons ban, have no effect on whether an assault weapon is used in a public shooting. In addition, using data on the weapons used in each public shooting, we analyse whether the types of guns as well as the number of guns used during a public shooting is associated with the resulting number of victims and fatalities. Our results indicate that assault weapons use is not associated with more victims or fatalities. Additional assault guns are also not associated with more victims than other types of guns and have no significant

relationship with fatalities. The use of high-capacity magazines, hand guns and shotguns, however, are consistently associated with more victims and more fatalities during a given public shooting.

Finally, we analyse whether the mental health status of the gunman affects the number of victims and fatalities. Our data contain information on whether the gunman had been diagnosed with mental illnesses, whether he had taken medication and whether he was currently off the medication at the time of the shooting. Overall, the mental health of the gunman is positively correlated with the number of victims and use of depression medication is positively correlated with both the number of victims and the number of fatalities.

This article provides an important contribution to our understanding about laws associated with public shootings and their outcomes. Many papers have researched the determinants of gun crime more broadly. For example, Duggan (2001) uses gun magazine subscriptions as a proxy for gun ownership to show that more guns are associated with increased crime. Other papers show that economic factors such as unemployment rates and incomes are associated with crime rates (Becker 1968; Corman and Mocan 2005; Gould, Weinberg, and Mustard 2002; Raphael and Winter-Ebmer 2001). Another strand of literature evaluates the effects of gun legislation on crime. Kwon et al. (1997), for example, find that states with restrictions such as licence requirements and waiting periods have fewer gun deaths, but the result is not significant in statistical terms. Lott and Mustard (1997) and Moody (2001) show that right to carry laws lead to less violent crime, but others find conflicting evidence (Ayres and Donohue 2003; Duggan 2001; Olson and Maltz 2001). In another study, Kwon and Baack (2005) form a comprehensive measure of gun control legislation and find that this measure is associated with fewer gun-related deaths. The objectives in these papers are focused solely on gun crime. We extend this literature by specifically examining the determinants and factors that affect whether a public shooting occurs and public shooting outcomes.

Other studies have examined public shootings. For instance, Chapman et al. (2006) look at the effects of broad gun reforms that removed semi-automatic guns, pump-action shotguns and rifles from civilian possession in Australia on gun violence, including public shootings. They find that the reforms were associated with a sharp decline in public shootings. Additionally, Duwe, Kovandzic, and Moody (2002) and Lott and Landes (2000) look at whether right to carry laws influence public shootings in the United States. Our analysis extends the literature by analysing a large panel to test the relation between many gun laws and public shootings. Our article also looks at whether state and federal assault weapon bans influence whether or not these types of weapons were used in the cross section of public shootings. Finally, our analysis extends previous work by looking at the cross-sectional data to estimate how event-specific characteristics influence the outcomes of public shootings.

This article proceeds as follows: Section II describes the data used in the analysis, Section III details the results, and Section IV concludes.

II. Data description

The shooting event data were obtained and cross-referenced from multiple publically available data sources.[3] We identify 184 shooting events between 1982 and October 2015 as mass shootings, spree shootings or active shooter events. We follow the FBI's definition in defining each type of shooting event. 'Mass' shootings are defined based on the following: (1) shootings were carried out by a single gunman, (2) shootings happened during a single incident and (3) shootings occurred in a public place with a minimum of four fatalities.[4,5,6] 'Spree' shootings are defined as (1) shootings were carried out by a single gunman, (2) shootings happened across multiple locations with no break in time between the shootings and (3) shootings occurred in a public place with a minimum of two fatalities.[4,5,6] An 'Active shooter' incident is defined as (1) an individual actively engaged in killing or attempting to kill people, (2)

[3]The Stanford Mass Shootings of America (MSA) data project, the Global Terrorism Database, a compiled data set by Follman, Aronson, and Pan (2012), and the Department of Justice's study on active shooter incidence in the United States.
[4]Serial Murder: A Multi-Disciplinary Perspective for Investigators. The Federal Bureau of Investigations. https://www.fbi.gov/stats-services/publications/serial-murder/serial-murder-july-2008-pdf.
[5]The exception of a 'single' gunman is the case of the Columbine massacre and the Westside Middle School killings, both of which involved two shooters.
[6]The gunman is excluded in the victim count.

shooting occurs in a confined/unconfined and populated area and (3) the subject's criminal actions involve the use of firearms.[7]

Data specific to the mass shooting include location (city and state), date of the mass shooting, the number of fatalities, the number of non-fatal victims and the venue of the mass shooting. Data specific to the gunman in the mass shooting include race, gender, age, prior signs of mental illness, known prescribed mental illness medication, prescribed medicine adherence at the time of the mass murder, suicide by the gunman, whether police killed the gunman and whether the gunman was arrested. Data specific to the weapons used in the mass murder include whether the weapon was obtained legally, the type of weapon used, the number of each type of weapon and the capacity of the ammunition magazine(s).

We obtain state-specific gun law data from each state's Department of Public Safety (or related department as the name varies by state), the United States Bureau of Alcohol, Tobacco, and Fire Arms and the United States Code of Federal Regulations (CFR) Title 27, Part 1 sub-chapter C. Nine different state-specific gun laws are included in our analysis as well as the federal ban on assault weapons. These are described in detail as follows.

Assault weapons ban

Federal regulation which bans the possess, import or purchase assault weapons or cosmetic features that would classify a firearm as an assault weapon, except for those already in lawful possession at the time of the law's enactment. The Federal Assault Weapons Ban of 1994 defined certain firearms as assault weapons based on the features they possessed (Public Safety and Recreational Firearms Use Protection Act, H.R.3355, 103rd Congress (1993–1994)).

Assault weapons law

The federal assault weapons ban expired in 2004; however, several states either fully adopted or have modified the definitions of the 2004 law. Seven states and the District of Columbia have enacted assault weapon bans or restrictions with various definitions and criteria.

Purchase permit

A certificate, identification card or other permit (terminology varies state by state) is required to acquire/purchase any lawful firearm.

Gun registration

Requires gun owners to record the ownership of their firearms with a designated law enforcement agency.

Licence requirement

Requires a state licence to possess a lawful firearm.

Concealed carry permit (CCW)

Permits the carry of a lawful firearm in public in a concealed manner on one's person or in close proximity. Requirements for CCW vary widely by state with a typical permit requiring residency, minimum age, submitting fingerprints, passing a computerized instant background check (or a more comprehensive manual background check), attending a certified handgun/firearm safety class, passing a practical qualification demonstrating handgun proficiency and paying a required fee.

Open carry

Permitting the carry of a lawful firearm in public in an open manner where a casual observer can observe an individual carrying a firearm. Similar to a CCW, requirements for open carry vary widely by state with a typical permit requiring the same standards listed above for CCW.

NFA restrictions

The National Firearms Act of 1968 defines a number of categories of regulated firearms which are collectively known as NFA firearms. These range from the

[7]A Study of Active Shooter Incidents in the United States between 2000 and 2013. The United States Department of Justice and the Federal Bureau of Investigation. https://www.fbi.gov/news/stories/2014/september/fbi-releases-study-on-active-shooter-incidents/pdfs/a-study-of-active-shooter-incidents-in-the-u.s.-between-2000-and-2013.

firing capacity (semi and full automatic) of a firearm, the length of the firearm barrel, suppression devices and ancillary devices considered destructive devices (i.e. grenades, bombs, explosive missiles, poison gas weapons and other comparable devices).

Peaceable journey law

Regulates the transport a firearm for any lawful purpose from any place where he may lawfully possess and carry such firearm to any other place where he may lawfully possess and carry the firearm if, during transportation, the firearm is unloaded, and neither the firearm nor any ammunition being transported is readily accessible or is directly accessible from the passenger compartment of such transporting vehicle.

Stand your ground

Legal concept that a person may justifiably use force in self-defence when there is reasonable belief of an unlawful threat at any location, without an obligation to retreat first. This is analogous to the Castle doctrine, stating that a person has no duty to retreat when their home is attacked.

Figure 1 shows the distribution of events in our data. The wide bars illustrate average fatalities over time, the narrow bars illustrate the average number of victims over time and the line illustrates the number of events over time. It is clear that the number of events has increased in recent history, although the severity of events as measured by the number of fatalities and victims does not show a clear trend.

Table 1 reports statistics that describe the sample of state-year data. We include all 50 states as well as Washington D.C.[8] With 51 states and 33 years of observable data, we have 1683 state-year observations. In addition to whether an event occurs, we also report *Population*, which is the state population according to the U.S. Census, and *Income*, which is the aggregate level of personal income gathered from the U.S. Bureau of Economics Analysis. We then create indicator variables that capture whether or not a state had one of each of the gun laws during a particular year.

Table 1. Summary statistics: panel data (obs. = 1683).

	Mean	Standard deviation	Min	Max
Active shooter event	0.09	0.29	0	1
Population (million)	5.39	6.01	0.45	38.8
Income (billion USD)	157	0.22	0.01	1.94
Year	1998	9.52	1982	2014
Purchase permit	0.27	0.45	0	1
Gun register	0.12	0.32	0	1
Assault law	0.13	0.33	0	1
Licence requirement	0.10	0.30	0	1
CCW permits	0.88	0.32	0	1
Open carry	0.71	0.46	0	1
NFA restrictions	0.39	0.49	0	1
Peaceable journey law	0.43	0.50	0	1
Stand your ground	0.78	0.42	0	1
AR-Ban	0.30	0.46	0	1

Table 1 shows that a shooting event occurred in approximately 9% of the state-year observations. The mean state population during that time was 5.39 million and aggregate personal state income totalled $157 million. The gun law indicators show for what fraction of state-year observations various gun laws held. For example, only 10% of the state-year observations had licence requirements while 88% of the observations required CCW permits.

For the 184 shooting events that occurred in the United States between 1982 and 2014, we also gather information particular to each event. This information is summarized in Table 2. Outcome variables include the number of individuals that were injured or killed (*Victims*) and the number of fatalities (*Fatalities*). Explanatory variables include the age of the gunman (*Age*), an indicator variable capturing whether the gunman was a minority (*Minority*) and an indicator variable for whether there were reported signs that the gunman suffered from possible mental illness (*Mental Illness*). We also gather data on the venue of the mass shooting. *School* and *Workplace* are indicator variables for whether the mass shooting occurred at a school or workplace. To examine cultural influences on violence, we include a variable *Culture of Honour* defined by states in the Southern United States which are considered honour states. A culture of honour is a culture where people avoid intentionally offending others and maintain a reputation for not accepting improper conduct by others. Brown et al. (2009) show that culture of honour states are more likely to have students carry weapons to school and are more likely to experience school shootings.

[8]We note that results reported in this study are qualitatively similar when we exclude Washington D.C. and just use the 50 states.

Table 2. Summary statistics: cross-sectional data (obs. = 184).

	Mean	Standard deviation	Min	Max
Victims	8.82	9.73	0	70
Fatalities	4.23	4.72	0	33
Age	36.64	15.14	12	89
Minority	0.36	0.48	0	1
Mental Illness	0.46	0.50	0	1
Use Depression Med	0.14	0.35	0	1
Off Depression Med	0.09	0.29	0	1
School	0.22	0.42	0	1
Workplace	0.54	0.50	0	1
Culture of Honour State	0.67	0.47	0	1
Year	2006.14	7.16	1982	2015
Arrested	0.37	0.48	0	1
Police	0.20	0.40	0	1
Legal Gun	0.87	0.34	0	1
#Guns	1.80	1.19	1	9
#Handguns	1.05	0.79	0	4
#Revolvers	0.14	0.49	0	5
#Shotguns	0.28	0.52	0	2
#Assault Guns	0.34	0.53	0	2
D_Handguns	0.78	0.41	0	1
D_Revolvers	0.11	0.31	0	1
D_Shotguns	0.24	0.43	0	1
D_Assaultguns	0.31	0.46	0	1
High Capacity Magazine	0.37	0.48	0	1
Purchase Permit	0.38	0.49	0	1
Gun registration	0.22	0.42	0	1
Assault weapon law	0.26	0.44	0	1
Licence requirement	0.08	0.27	0	1
CCW permits	0.84	0.37	0	1
Open carry	0.83	0.38	0	1
NFA restrictions	0.48	0.50	0	1
Peaceable journey laws	0.34	0.47	0	1
Stand your ground	0.83	0.38	0	1

From various reports, we also obtain data on the guns used during the mass shooting. *Legal Gun* is an indicator variable for whether the gun (or guns) used by the gunman at the mass shooting was obtained legally. Specifically, *Legal Gun* includes (according to state law) if the firearm(s) was/were registered, if a permit was required for ownership and/or if a licence was required for ownership. As part of the legal purchase of a firearm, FBI instant background checks are required of all purchasers. The expectation to the background check regulation is the Private Sale Exemption, otherwise known as the widely debated 'Gun Show Loophole'. Under federal law, private-party sellers are not required to perform background checks on buyers, record the sale or ask for identification. However, according to a National Institute of Justice, the research arm of the U.S. Department of Justice, study, only 2% of criminal guns come from gun shows.[9] As of September 2015, 18 states and Washington D.C. have background check requirements beyond federal law. Eight states require universal background checks at the point of sale for all transfers, including purchases from unlicensed sellers.

More detailed weapon information reported in Table 2 includes the total number of guns at the scene (*#Guns*), the number of handguns (*#Handguns*), the number of revolvers (*#Revolvers*), the number of shot guns (*#Shotguns*) and the number of assault weapons (*#Assault Guns*).[10,11] We also create indicator variables for the various gun types used in the sample of mass shootings. *D_Handgun, D_Revolvers, D*_Shotguns and *D_Assaultguns* indicate that a hand gun, revolver, shot gun or assault weapon was used during the mass shooting, respectively. In addition to the gun types, we create an indicator variable for whether a high-capacity magazine (*High Capacity Magazine*) was used. We define a high-capacity magazine according to the commonly accepted definition used under the United States' Federal Assault Weapons Ban, which expired in 2004, as a magazine capable of holding more than 10 rounds of ammunition. In addition to the information about the gun types, Table 2 also includes indicator variables that capture the nine common gun laws in each state where a mass shooting occurred.

Table 2 shows that the mean number of victims is 8.82 while the mean number of fatalities is 4.23. We note that the minimum number of fatalities is 0.00 as we have included not only mass and spree shootings but active shooter incidences which by definition do not require a fatality. The average age of a gunman is slightly over 36. Approximately 36% of gunmen were minorities and more than 46% of gunmen had possible signs of mental illness. This latter summary statistic suggests that policymakers and regulators might attempt to address mental health issues in an attempt to deter the number of active shooting incidences. We further explore this possibility below.

[9]Homicide in eight US cities: Trends, Context, and Policy Implications. National Institute of Justice, U.S. Department of Justice. https://www.ncjrs.gov/pdffiles1/ondcp/homicide_trends.pdf.

[10]Handgun (27 CFR 478.11). (a) Any firearm which has a short stock and is designed to be held and fired by the use of a single hand; and (b) Any combination of parts from which a firearm described in paragraph (a) can be assembled.

[11]Revolver (27 CFR 478.11). A weapon originally designed, made, and intended to fire a projectile (bullet) from one or more barrels when held in one hand, and having (a) a chamber(s) as an integral part(s) of, or permanently aligned with, the bore(s); and (b) a short stock designed to be gripped by one hand and at an angle to and extending below the line of the bore(s).

Table 2 also shows that 22% of active shooter events occurred at schools and 54% occurred at places of work. The remaining 24% of events did not occur at one of these two venues. We found that 67% of active shooter incidences occurred in states which are considered to have a culture of honour. In Table 2, we also find that 87% of guns used in the cross section of mass shootings were obtained legally. The average total number of guns used by a gunman is 1.80, the average number of handguns used is 1.05, the average number of revolvers used is 0.14, the average number of shotguns used is 0.28 and the average number of assault weapons used is 0.34. These simple statistics suggest that hand guns are used the most and nearly three times as much as assault weapons, which is the second most commonly used gun type in the sample. When examining the gun-type indicator variables, at least one hand gun was used 78% of the time, while revolvers were used 11% of the time, shotguns were used 24% of the time and assault weapons were used approximately 31% of the time. High-capacity magazines were used in 37% of active shooter events.

Table 2 also reports the summary statistics for the nine common state gun laws that were in existence during the year the mass shooting occurred. We find that nearly 38% of events took place in states that required purchase permits, 22% in states that required the registration of fire arms, 26% in states that had an assault weapons law, 8% in states that had licence requirements, 84% in states that had conceal and carry permit laws, 83% in states that had open carry laws, 48% in states that had restrictions on NFA-classified weapons, 34% in states that had peaceable journal laws and 83% in states that had stand your ground laws and the time of the mass shooting.

III. Empirical results

In this section, we present our empirical results. First, we examine how state-specific characteristics such as population, income and gun laws affect the likelihood of an active shooter event in a particular state during a particular year. Second, we determine whether certain gun laws targeting the prohibition of assault weapon use affect the likelihood that assault weapons were used in an active shooter event. Third, we examine cross-sectional factors that explain the number of victims and the number of fatalities during an event by focusing on the types of guns used by the gunman as well as the mental health of the gunman.

Predictors of mass shootings

We begin by examining characteristics that influence the likelihood of an active shooter event in a particular state during a particular year. Utilizing the panel data set described above, we estimate the following equation with a probit regression.

$$Event_{i,t} = \gamma_0 + \theta_{j,i,t}\sum_{j=1}^{10} GunLaws_{i,t} + \gamma_1 PersIncome_{i,t} + \gamma_2 Population_{i,t} + \gamma_3 Year_t + \varepsilon_i + \eta_{i,t} \quad (1)$$

Event is equal to one if an active shooter event occurred in state i during year t, zero otherwise. The independent variables include nine indicator variables that capture whether a particular gun law existed in state i during year t as well as a dummy variable capturing the time period when the federal ban on assault rifles existed from September 1994 to September 2004 (*AR-Ban*). We also include state aggregated personal income in $ billions (*Income*) and state population in millions (*Population*). In order to control for any time trend in active shooter events, we include a count variable *Year*, which equals the year of a particular observation. Finally, we include state fixed effects to account for omitted time invariant variables (ε_i).

Table 3 reports the marginal effects from estimating variations of Equation (1) with robust standard errors clustered by state. Column 1 reports the probit regression results when we only include the gun law indicator variables. The first important result is that 7 of the 10 indicator variables produce estimates that are not statistically different from zero. We note that the indicator variable *Assault Law* produces a negative and significant coefficient while *AR-Ban and Stand Your Ground* produce positive and significant estimates. These results indicate that state assault weapon bans are associated with a lower likelihood of an active shooter event while the federal assault weapons ban and stand your ground laws are associated with an increase in the probability of an event. When we

Table 3. Determining active shooter events: effect of gun laws.

	1	2	3
AR-Ban	0.078**	0.004	−0.068**
	(0.034)	(0.020)	(0.032)
Assault Law	−0.042***	−0.022*	−0.045**
	(0.016)	(0.012)	(0.018)
Purchase Permit	−0.006	−0.024	0.372
	(0.036)	(0.016)	(0.358)
Gun register	0.059	−0.007	0.115
	(0.061)	(0.018)	(0.139)
Licence requirement	−0.047	−0.003	−0.271
	(0.033)	(0.017)	(0.207)
CCW permits	−0.034	−0.020	0.276
	(0.048)	(0.022)	(0.258)
Open carry	−0.021	0.010	0.312
	(0.030)	(0.011)	(0.289)
NFA restrictions	−0.004	0.017	0.346
	(0.033)	(0.018)	(0.288)
Peaceable journey law	−0.017	−0.010	−0.404
	(0.024)	(0.012)	(0.350)
Stand your ground	0.050**	−0.004	−0.181***
	(0.022)	(0.019)	(0.044)
Income (billion USD)		−0.023	0.688***
		(0.066)	(0.238)
Population (million)		0.008***	−0.020
		(0.002)	(0.022)
Year		0.006***	0.004***
		(0.001)	(0.001)
State fixed effects	No	No	Yes
Observations	1683	1683	1683

The dependent variable is an indicator for an active shooter event. Coefficients in columns 1 and 2 represent marginal effects from probit regressions. Column 3 provides the coefficients from a linear probability model. Robust standard errors in parentheses.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

include controls for population and personal income in column 2, the estimates on the *AR-Ban* and *Stand Your Ground* indicator variables are no longer significant. Further, the coefficient on *Assault Law* is only marginally significant. Again, none of the other seven indicator variables produces a significant coefficient. We note, however, that the estimates for *Population* and *Year* are positive and significant in column 2, reflecting the fact that incidents occur in states with higher populations and have increased over time.

Column 3 presents the results from a linear probability model where we include state fixed effects.[12] A few results are noteworthy. First, we find that the coefficient on *Stand Your Ground* becomes negative and significant at the 0.01 level while the coefficients on *AR-Ban* and *Assault Law* are negative significant at the 0.05 level. We also find that, when controlling for state fixed effects, *Income* and *Year* produce positive and significant coefficients while *Population* does not. Combined, the results in Table 3 show that any effect that gun laws have on the likelihood of an active shooter outcome depends on the econometric specification. Further, many of the gun laws analysed in the table have no effect on the probability of an event. The only estimate that is consistently negative is the coefficient on state assault weapons laws. These results might contribute to policy debate about the effectiveness of gun laws on active shooter events.

Gun laws and weapon choice

Next, we examine whether gun laws, including the Federal Assault Weapons Ban, affected the use of assault weapons during an active shooter event. Using the cross-sectional data, we estimate the following equation:

$$\begin{aligned} AR\_used_i = {} & \gamma_0 + \gamma_1 AR - Ban_t + \gamma_2 Assault\ Law_t \\ & + \gamma_3 Age_i + \gamma_4 Minority_i + \gamma_5 School_i \\ & + \gamma_6 Workplace_i + \gamma_6 Cutlure\ of\ Honour \\ & State_i + \gamma_7 Mental\ Illness_i + \gamma_8 LegalGun_i \\ & + \gamma_9 Year_t + \theta_{j,i,t} \sum_{j=1}^{8} GunLaw_{i,t} + \eta_i \end{aligned} \tag{2}$$

Here, the dependent variable is equal to unity if an assault weapon was used during an event and zero otherwise. The independent variables of interest are an indicator variable capturing the period when the Federal Assault Weapons Ban existed (September 1994 to September 2004) as well as an indicator variable capturing whether the state in which the event occurred had an assault weapons law. Other control variables include characteristics of the gunman and the venue, such as *Age, Year*, and indicator variables for *Minority, School, Workplace, Culture of Honour State, Mental Illness* and *Legal Gun*. We also include eight indicator variables that capture the remaining state gun laws.

Table 4 reports the results from estimating Equation (2) using probit regressions. We report the marginal effects from the probit estimates as well as robust standard errors. In column 1, we only include the indicator variables *AR-Ban* and *Assault Law*. The estimates are statistically insignificant, indicating that neither the federal assault weapon ban nor state assault weapon bans affect the probability that assault weapons are used in an active shooter event. In column 2, we include control

[12]We use a linear probability model instead of a probit given the biases and inconsistency found in fixed effects estimators for non-linear models (see Greene 2004).

Table 4. Determinants of the use of assault weapons.

	1	2	3	4
AR-Ban	−0.161	−0.157	−0.226	−0.233
	(0.162)	(0.169)	(0.181)	(0.182)
Assault Law	0.192	0.201	0.167	0.218
	(0.199)	(0.210)	(0.232)	(0.246)
Age		−0.001		−0.002
		(0.003)		(0.003)
Minority		−0.082		−0.090
		(0.073)		(0.074)
School		0.079		0.082
		(0.114)		(0.119)
Workplace		0.018		0.010
		(0.088)		(0.088)
Culture of Honour State		0.024		0.061
		(0.074)		(0.090)
Mental Illness		0.072		0.045
		(0.069)		(0.071)
Legal Gun		0.008		−0.005
		(0.103)		(0.101)
Year		−0.006		−0.004
		(0.005)		(0.005)
Purchase Permit			0.214*	0.202
			(0.124)	(0.138)
Gun register			0.003	−0.034
			(0.124)	(0.135)
Licence requirement			−0.046	0.069
			(0.158)	(0.194)
CCW permits			0.021	0.014
			(0.111)	(0.116)
Open carry			−0.090	−0.041
			(0.117)	(0.123)
NFA restrictions			−0.083	−0.099
			(0.121)	(0.123)
Peaceable journey law			0.051	0.019
			(0.098)	(0.097)
Stand your ground			0.162*	0.191**
			(0.083)	(0.082)
Wald	0.98	6.19	9.91	14.95
p-Value	0.613	0.721	0.449	0.599
Observations	184	184	184	184

Coefficients represent marginal effects from probit regressions. Robust standard errors in parentheses.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

variables for characteristics of the gunman and venue as well as the variable *Year*. Again, we do not find that either federal laws or state laws affect the use of assault weapons. We also note that none of the control variables are significantly different from zero. Column 3 includes additional indicator variables capturing the other eight common state gun laws. Again, we do not find that *AR-Ban* and *Assault Law* produce significant estimates. We do, however, find that *Purchase Permit* and *Stand Your Ground* produce positive and significant coefficients. Column 4 reports the results of the full model. When including the control variables that capture the characteristics of the gunman and venue, the estimate for *Purchase Permit* is no longer significant. However, the coefficient on *Stand Your Ground* remains positive and significant, suggesting that states with stand your ground laws were more likely to have an active shooter event where the shooter used an assault weapon. Perhaps more importantly, neither *AR-Ban* nor *Assault Law* produce significant coefficients. Overall, the results in Table 4 support the idea that gun laws targeting the restriction of assault weapons do not impact whether these weapons are used during an active shooter event.

Explaining the number of victims and fatalities: gun characteristics

In this section, we attempt to identify factors that influence the number of victims and the number of fatalities in an active shooter event. In particular, we examine the effect of the number and types of guns used on the number of victims and fatalities. We also include a variety of control variables that might provide some important inferences. We estimate the following equation using our cross-sectional sample of active shooter events:

$$\begin{aligned} Victims/Fatalities_i = {} & \beta_0 + \beta_1 Legal\,Gun_i \\ & + \beta_2 D\_Hand\ guns_i \\ & + \beta_3 D\_Revolvers_i \\ & + \beta_4 D\_Shotguns_i + \beta_5 D\_Assault_i \\ & + \beta_6 High\ Capacity\ Magazine_i \\ & + \beta_7 Age_i + \beta_8 Minority_i \\ & + \beta_9 School_i + \beta_{10} Workplace_i \\ & + \beta_{11} Culture\ of\ Honour\ State_i \\ & + \beta_{12} Mental\ Illness_i \\ & + \beta_{13} Arrested_i + \beta_{14} Shot\ by \\ & Police_i + \beta_{15} Year_i + \varepsilon_i \end{aligned} \tag{3}$$

The dependent variable is either the number of victims (*Victims*) or the number of fatalities (*Fatalities*) during an event. Independent variables of interest include *Legal Gun, D_Handguns, D_Revolver, D_Shotguns, D_Assault* and *High Capacity Magazine*. Additional control variables include *Age* and the indicator variables for *Minority, School, Workplace, Culture of Honour State* and *Mental Illness*. In addition to the demographic information about the gunman and the venue, we also control for the outcome of the event. *Arrested* is an indicator variable for whether the gunman was arrested. *Shot by Police* is an indicator variable for whether the gunman was shot by

police officers. The omitted dummy category consists of cases when the gunman committed suicide. As before, we also control for *Year*.

Since the dependent variables are discrete count variables, we use negative binomial regressions. While the Poisson regression also allows for consistent estimates using count data, the Poisson model makes more restrictive distributional assumptions than the negative binomial model by requiring means and variances to be equal. The summary statistics of both *Victims* and *Fatalities* in Table 2 show that the variances of both *Victims* and *Fatalities* are much larger than the means, suggesting that the dependent variables are over-dispersed. Therefore, we report the results from the negative binomial regressions along with robust standard errors in Table 5, although we note that qualitatively similar results are found when we use Poisson regressions to estimate Equation (3).

Column 1 shows the results from a simple regression where the dependent variable is *Victims* and the only independent variable is the indicator variable *Legal Gun*. We do not find that *Legal Gun* produces an estimate that is significantly different from zero. In column 2, we include indicator variables for each of the gun types. We find that the estimates for each of the indicator variables produce positive estimates that are statistically different from zero. However, we cannot reject the null that the coefficients are equal to each other. This suggests that there is not one type of gun that causes more victims than another. In column 3, we estimate a simple regression where we only include the indicator variable *High Capacity Magazine* and find that the estimate is positive and statistically significant. In column 4, we find that *D_Handguns* and *D_Shotguns* retain their positive and significant estimates, but the coefficients on *D_Revolvers* and *D_Assault* do not. Moreover, the coefficient on *D_Assault* is statistically lower than the coefficients on *D_Handguns* and *D_Shotguns* and the coefficient on *D_Revolvers* is statistically lower than the coefficient on *D_Shotguns*. We also note that *High Capacity Magazine* produces a positive and significant estimate, which is similar to the simple regression in column 3. A few other results are noteworthy. We find significantly negative

Table 5. Determining the number of victims and fatalities: effect of gun types.

	Dependent variable: victims				Dependent variable: fatalities			
	1	2	3	4	5	6	7	8
Legal Gun	−0.122			0.118	−0.242			0.011
	(0.222)			(0.143)	(0.250)			(0.181)
D_Handguns		0.430**		0.386***		0.431**		0.437***
		(0.173)		(0.141)		(0.189)		(0.168)
D_Revolvers		0.288**		0.143		0.541***		0.330***
		(0.138)		(0.125)		(0.129)		(0.119)
D_Shotguns		0.443***		0.620***		0.391**		0.605***
		(0.170)		(0.132)		(0.181)		(0.161)
D_Assault		0.373**		−0.083		0.097		−0.234
		(0.160)		(0.152)		(0.172)		(0.185)
High Capacity Magazine			0.591***	0.478***			0.403**	0.388**
			(0.154)	(0.147)			(0.166)	(0.164)
Age				−0.009***				−0.004
				(0.003)				(0.004)
Minority				−0.074				0.068
				(0.114)				(0.142)
School				−0.393**				−0.570***
				(0.191)				(0.219)
Workplace				−0.517***				−0.719***
				(0.134)				(0.136)
Culture of Honour State				0.072				−0.046
				(0.105)				(0.137)
Mental Illness				0.339***				0.261**
				(0.113)				(0.131)
Arrested				−0.186				−0.598***
				(0.119)				(0.137)
Shot by Police				−0.246*				−0.441***
				(0.136)				(0.171)
Year				−0.034***				−0.031***
				(0.007)				(0.008)
Observations	184	184	184	184	184	184	184	184

Coefficients from negative binomial regressions. Robust standard errors in parentheses.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

coefficients for *Age, School, Workplace, Shot by Police* and *Year* and a positive and significant coefficient on the indicator variable *Mental Illness*. This latter finding suggests that mentally ill gunman generally inflict injury upon a greater number of individuals. The negative coefficient on *Year* suggests that while the likelihood of events has increased over time the severity as measured by victims and fatalities has decreased.

To determine the economic magnitude of any of the estimated coefficients, we transform the negative binomial estimate into percentage differences using the expression $100 \times \{\exp(\beta_j) - 1\}$, where β_j is one of the j estimated coefficients from Equation (3). Focusing on column 4, the use of this expression for the estimated coefficient for, say, *D_Handguns*, we find that when a handgun is used by a gunman, the number of victims increases approximately 47%. When shotguns or high-capacity magazines are used, the number of victims increases by 86% or 61%, respectively. Further, mentally ill gunmen generally have a 40% higher number of victims than non-mentally ill gunman.

The results in column 4 provide some important insights into the outcomes of active shooter events. First, we find that mental illness and high-capacity magazines are positively correlated with the number of victims during these types of incidents. Second, while handguns and shotguns also correlated with the number of victims, assault weapons are not. Third, younger shooters, at places other than schools or workplaces, generally have a higher number of victims. Lastly, we find that, in cases where the gunman is shot by police, the number of victims decreases by nearly 28%.

Columns 5–8 report the results when the number of fatalities is used as the dependent variable. Results in columns 5–7 are generally similar to those in the full model (column 8), so, for brevity, we only discuss the findings in column 8. We also find that the conclusions that we draw in column 4 are somewhat similar to those in column 8. For instance, *D_Handguns, D_Shotguns, High Capacity Magazines* and *Mental Illness* produce positive estimates while *School, Workplace, Shot by Police* and *Year* produce negative coefficients. However, we also find a significantly positive estimate on *D_Revolvers* and a significantly negative estimate on *Arrested*. Focusing on the magnitude of the coefficients in column 8 to the corresponding coefficients in column 4, the economic significance seems to be similar between columns.[13,14]

Next, we extend our analysis by examining the number of guns and gun types instead of looking only at the whether a particular type of gun was used in the mass shooting. To do so, we estimate a variant of Equation (3) as follows:

$$\begin{aligned} Victims/Fatalities_i = {} & \beta_0 + \beta_1 \#\,Gun_i \\ & + \beta_2 \#\,Hand\ guns_i \\ & + \beta_3 \#\,Revolvers_i \\ & + \beta_4 \#\,Shotguns_i + \beta_5 \#\,Assault_i \\ & + \beta_6 Age_i + \beta_7 Minority_i \\ & + \beta_8 School_i + \beta_9 Workplace_i \\ & + \beta_{10} Culture\ of\ Honour\ State_i \\ & + \beta_{11} Mental\ Illness_i \\ & + \beta_{12} Arrested_i + \beta_{13} Shot\ by \\ & Police_i + \beta_{14} Year_i + \varepsilon_i \end{aligned} \tag{4}$$

In Equation (4), the dependent and independent variables are the same as in Equation (3) with one exception. Instead of including indicator variables for gun types, in Equation (4) we include the total number of guns (*#Guns*), the number of handguns (*#Handguns*), the number of revolvers (*#Revolvers*), the number of shotguns (*#Shotguns*) and the number of assault weapons (*#Assault Guns*). The results are reported in Table 6. For brevity, we will discuss the results from the full models in columns 3 and 4 and columns 7 and 8. In column 3, we find that, after controlling for a variety of independent variables, the estimate for *#Guns* is significantly positive. In economic terms, a unit increase in the number of guns is associated with a 21.7% increase in the number of

[13] As a measure of robustness, we estimate Equation (3) using a different definition for assault weapons. Instead of the definition used for Assault Weapons according to FBI reports, we redefine Assault Weapons using a broader definition that has been used in a bill that was introduced 24 January 2013 that would impose various bans on assault weapons. Results from these tests again show that whether a gun that was used under this alternative definition is unrelated to the number of injured victims or the number of fatalities.

[14] As another measure of robustness, instead of including an indicator variable for the use of high-capacity magazines, we include the number of guns that were used with high-capacity magazines. These unreported tests also show a direct relation between the number of guns with high-capacity magazines and the number of injured victims as well as the number of fatalities. The results from these tests are available upon request from the authors.

Table 6. Determining the number of victims and fatalities: effect of the number of guns.

	Dependent variable: victims				Dependent variable: fatalities			
	1	2	3	4	5	6	7	8
#Guns	0.268***		0.196***		0.228***		0.178***	
	(0.072)		(0.058)		(0.068)		(0.057)	
#Handguns		0.300***		0.258***		0.288***		0.247**
		(0.095)		(0.078)		(0.109)		(0.097)
#Revolvers		0.051		−0.047		0.238		0.104
		(0.095)		(0.066)		(0.169)		(0.067)
#Shotguns		0.331**		0.362***		0.285*		0.369***
		(0.135)		(0.114)		(0.152)		(0.135)
#Assault Guns		0.323**		0.189*		0.081		−0.006
		(0.133)		(0.100)		(0.132)		(0.127)
Age			−0.010***	−0.010***			−0.005	−0.005
			(0.003)	(0.003)			(0.005)	(0.004)
Minority			−0.053	−0.000			0.128	0.161
			(0.128)	(0.125)			(0.153)	(0.148)
School			−0.484**	−0.514***			−0.645***	−0.668***
			(0.201)	(0.194)			(0.217)	(0.207)
Workplace			−0.648***	−0.669***			−0.811***	−0.833***
			(0.152)	(0.148)			(0.141)	(0.138)
Culture of Honour State			0.032	0.051			−0.076	−0.073
			(0.110)	(0.107)			(0.145)	(0.139)
Mental Illness			0.326***	0.338***			0.251*	0.273**
			(0.120)	(0.118)			(0.141)	(0.136)
Arrested			−0.165	−0.153			−0.581***	−0.585***
			(0.131)	(0.124)			(0.145)	(0.140)
Shot by Police			−0.200	−0.216*			−0.376**	−0.389**
			(0.139)	(0.130)			(0.178)	(0.168)
Year			−0.026***	−0.029***			−0.025***	−0.026***
			(0.007)	(0.007)			(0.007)	(0.007)
Observations	184	184	184	184	184	184	184	184

Coefficients from negative binomial regressions. Robust standard errors in parentheses.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

victims. The other control variables produce coefficients that are similar in sign and magnitude to the corresponding coefficients in the previous table. In column 4, we find that the estimates for *#Handguns, #Shotguns* and *#Assault Guns* produce estimates that are positive and significant at the 0.10 level or lower. In economic terms, a unit increase in the number of handguns, shotguns and assault weapons is associated with a 29%, 44% and 21% increase, respectively, in the number of victims. In this case, we cannot say that assault guns have a statistically different impact on victims than the other types of guns.

Columns 5–8 report the results when the dependent variable is the number of fatalities. We report that while *#Handguns* and *#Shotguns* produce positive and significant estimates, *#Assault Guns* does not. In addition, the coefficient on *#Assault Guns* is statistically lower than the coefficients on *#Handguns* and *#Shotguns*. We still observe negative coefficients on the indicator variables for *School, Workplace, Arrested, Shot by Police* and *Year*. Further, the estimate for *Mental Illness* is positive and significant. Results in this subsection have interesting and important implications. First, the use of assault weapons is not necessarily associated with more injuries or more deaths in our cross section of active shooter events. Instead, the use of handguns and shotguns is more highly correlated with the number of victims/fatalities. Second, mentally ill gunmen have a higher number of victims and fatalities than non-mentally ill gunmen. Third, law enforcement (in terms of arresting the gunmen or shooting the gunmen) is associated with a decrease in the number of victims/fatalities. The inferences from these tests are likely to contribute to the ongoing gun policy debate.[15]

Explaining the number of victims and fatalities: mental health characteristics

In Table 2, we found that 46% of the individuals responsible for active shooter events in the United States showed possible signs of mental illness according to various reports. Further, our findings in Tables 5 and 6 seem to indicate that mental illness is associated

[15]As mentioned in footnote 6, we use an alternative definition for assault weapons according to a bill voted on by the U.S. senate on 24 January 2013. Using this alternative definition for assault weapons, we are able to draw similar conclusions to those drawn in Table 6.

with a higher number of victims/fatalities. Given these statistics, we provide a more thorough examination of the role that mental illness plays in explaining the total number of victims and the number of fatalities. We not only examine reports of possible signs of mental illness, but we also gather information about the types of medication the gunman was prescribed and whether or not the gunman was on or off the prescribed medication at the time of the mass shooting.

We estimate the following equation using our cross-sectional sample of active shooter events:

$$\begin{aligned} Victims/Fatalities_i = {} & \beta_0 + \beta_1 MentalIll_i \\ & + \beta_2 Use\ DepMed_i \\ & + \beta_3 OffDepMed_i \\ & + \beta_4 Age_i + \beta_5 Minority_i \\ & + \beta_6 School_i + \beta_7 Workplace_i \\ & + \beta_8 Culture\ of\ Honour\ State_i \\ & + \beta_8 Arrested_i + \beta_9 PoliceShot_i \\ & + \beta_{10} Year_i + \varepsilon_i \end{aligned} \tag{5}$$

As before, the dependent variables are either the number of victims or the number of fatalities. The independent variables are similar to those used in the previous section. We control for *Age, Year* and include the indicator variables for *Minority, School, Workplace, Culture of Honour State, Arrested* and *Shot by Police*. The independent variables of interest in Equation (5) are the indicator variable, *Mental Illness*, for whether there were reported signs of mental illness in the gunman, the indicator variable *Use Depression Med*, for whether the gunman had reportedly been prescribed depression medication, and the indicator variable *Off Depression Med*, for whether the gunman had previously been prescribed depression medication, but was reported off the depression medication at the time of the incident.

Results from estimating Equation (5) using negative binomial regressions are reported in Table 7 along with robust standard errors. As before, in unreported tests we estimate Equation (5) using Poisson regressions and find results to be qualitatively similar to our negative binomial results. Columns 1–3 and 6–8 present the results from simple regressions where we include each independent variable of interest. Columns 5 and 10 report the results from estimating the full model for each dependent variable. Because we are able to draw inferences from the full models that are similar to those from the various simple regressions, we only discuss our findings in columns 5 and 10.

Column 5 shows that after controlling for a variety of other variables both *Mental Illness* and *Use Depression Med* produce estimates that are positive

Table 7. Determining the number of victims and fatalities: effect of mental status.

	Dependent variable: victims					Dependent variable: fatalities				
	1	2	3	4	5	6	7	8	9	10
Mental Illness	0.456***			0.396**	0.312**	0.325**			0.236	0.192
	(0.154)			(0.165)	(0.138)	(0.163)			(0.171)	(0.151)
Use Depression Med		0.518***		0.381**	0.335**		0.645***		0.513***	0.531***
		(0.156)		(0.165)	(0.162)		(0.136)		(0.152)	(0.163)
Off Depression Med			−0.279	−0.230	0.101			−0.933***	−0.833***	−0.448**
			(0.242)	(0.225)	(0.189)			(0.168)	(0.178)	(0.180)
Age					−0.010***					−0.004
					(0.004)					(0.005)
Minority					−0.137					0.032
					(0.138)					(0.162)
School					−0.433*					−0.514**
					(0.231)					(0.239)
Workplace					−0.622***					−0.693***
					(0.165)					(0.141)
Culture of Honour State					0.041					−0.074
					(0.121)					(0.156)
Arrested					−0.190					−0.603***
					(0.136)					(0.151)
Shot by Police					−0.232*					−0.386**
					(0.138)					(0.169)
Year					−0.031***					−0.031***
					(0.008)					(0.007)
Observations	184	184	184	184	184	184	184	184	184	184

Coefficients from negative binomial regressions. Robust standard errors in parentheses.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

and significantly differ from zero. These results suggest that differences in the mental health of the gunmen are directly associated with the number of victims in an active shooter event. This finding also states that despite the use of depression medication mental illness still has a direct effect on the number of victims.

Column 10 presents the coefficients when using the number of fatalities as the dependent variable. Here, we do not find that mental health of the gunman is correlated with the number of fatalities. However, we again find that the use of depression medication is associated with a higher number of fatalities. Interestingly, being off of depression medication is associated with a significantly lower number of fatalities. The coefficients for *School, Workplace, Arrested* and *Shot by Police* are again negative and significant at the 0.05 level, which is consistent with our findings in the previous tables. The results in this subsection have some important implications that might also add to the gun policy debate. While Table 2 shows that about 46% of gunmen had signs of mental illness, Tables 5 and 6 present some evidence that mental illness is indeed an important determinant of the number of victims/fatalities. In this last table, we observe that the use of depression medication is also associated with a high number of victims/fatalities. This could mean one of two things. First, the use of depression medication may simply signal that a particular gunman had severe mental health issues, which could explain the higher number of victims/fatalities. Second, our findings might suggest that depression medication is not an important deterrent in the severity of crimes committed by the mentally ill.[16]

IV. Conclusion

After recent active shooter events, policymakers have renewed the debate about how to prevent more of these incidents from occurring. A call for greater regulation has been made by the public as well as by politicians. However, little is known about the factors that impact whether an event occurs and the outcomes of such events. To inform policy, this study takes a comprehensive look at these types of incidents in the United States during the last 31 years. Our analyses find that most gun laws are not correlated with whether an event occurs, with the exception of state assault weapons laws which show a consistent negative correlation. However, neither state nor federal assault weapons laws are significantly related to whether these types of weapons are used in active shooter events.

When taking a closer look at the incidents themselves, our multivariate results show that the use of assault weapons is not generally associated with an increase in the number of victims or the number of fatalities. On the other hand, the uses of high-capacity magazines, handguns and shotguns are all consistently associated with increases in both the number of victims and fatalities. Combined with earlier findings, these results suggest that policymakers might want to focus future policy on other areas besides the regulation of assault weapons.

Our tests also show that signs of mental illness in the gunman are positively correlated with the number of victims and fatalities. In particular, current use of depression medication is significantly correlated with an increase in the number of victims and fatalities. These results indicate that improvements in mental health may reduce the severity of active shooter events.

Disclosure statement

No potential conflict of interest was reported by the authors.

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[16]We also ran regressions where we interacted mental illness with our other variables such as age, minority status and venue. We did not find any significant interaction effects.

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EXHIBIT 59

Weapons Effect

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Weapons are ubiquitous in the mass media and in everyday life. Does even short-term exposure to weapons lead to increased aggression? In the late 1960s, two researchers attempted to answer that question. Berkowitz and LePage (1967) published an experiment in which participants were exposed to either guns or badminton racquets after experiencing one electric shock (low provocation) or seven electric shocks (high provocation). The highly provoked participants who experienced short-term exposure to the rifles gave more shocks to their partner (thus indicating a higher level of aggression) than participants in any of the other treatment conditions. Since then, this phenomenon has been known as the weapons effect. In the ensuing decades, researchers interested in the weapons effect have examined short-term exposure not only to guns, but also knives and even Tasers on aggressive behavioral outcomes (Ariel et al., 2019; Benjamin, Kepes, & Bushman, 2018). This entry describes the potential influence of weapons on aggressive behavioral outcomes, explanations for why the weapons effect may occur, potential underlying processes, and the ongoing controversy regarding the extent to which the weapons effect is a valid area of inquiry.

During the 1970s and 1980s there were numerous attempts to replicate the initial weapons effect experiment (Benjamin, 2019). Although there were some apparent successful replications of the weapons effect (e.g., Leyens & Parke, 1975), there were also a number of studies reporting non-replication (e.g., Buss, Booker, & Buss, 1972). Critics initially argued that there were characteristics of the design of the original Berkowitz and LePage (1967) experiment which would lead participants to become suspicious and guess the hypothesis, or which would make participants more aware that they were being evaluated, and hence increase evaluation apprehension. These experimental artifacts were proposed to influence participants to behave more aggressively when exposed to weapons, thus invalidating the conclusions of the original Berkowitz and LePage (1967) experiment. Concerns regarding participant suspicion and evaluation apprehension appeared to be addressed in a series of experiments conducted in the mid-1970s (e.g., Simons & Turner, 1976) in which participants who were either suspicious or made aware that they were being evaluated showed a decrease in aggressive behavior, even when primed with weapons. However, in the conditions in which participants were blind to the hypothesis and were not given cues to make them apprehensive, they responded to weapons with increased aggression. In other words, under conditions in which participants were unaware of the hypothesis and not apprehensive, Simons and Turner (1976) appeared to replicate the findings of Berkowitz and LePage (1967). During this time, there were reports of mixed findings in experiments

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conducted in field settings (e.g., Turner, Layton, & Simons, 1975), as well as experiments in which children were participants, with images of weapons used instead of real weapons, and with aggressive behavioral measures other than electric shocks (see Benjamin et al., 2018). Some replications appeared to be successful, but others were not. Even though the body of published research on the weapons effect appeared ambiguous, an initial meta-analysis suggested that overall the weapons effect was robust under conditions in which participants were highly provoked (Carlson, Marcus-Newhall, & Miller, 1990).

In the 1990s, researchers began to explore more thoroughly the underlying processes that might explain the weapons effect. Much of this research was based on theories such as the general aggression model (Anderson & Bushman, 2002) or the cognitive neoassociation model (Berkowitz, 2012). According to these theoretical models, weapons prime the accessibility of aggressive thoughts, leading to a tendency to make primary threat appraisals, which would then influence the likelihood of an aggressive behavioral response (Benjamin & Bushman, 2016). Initial cognitive priming experiments in the 1990s were successful (e.g., Anderson, Benjamin, & Bartholow, 1998), and appear to have been successfully replicated over the ensuing two decades (Benjamin et al., 2018). Research on primary threat appraisal has shown that individuals show increased attention to the sight of weapons much the way individuals respond to the sight of natural threats such as venomous snakes and spiders (Benjamin & Bushman, 2016).

Since the 1990s, given the apparent success of cognitive priming experiments, the weapons effect has been treated as an established phenomenon. However, more recent evidence raised questions about the weapons effect. The most recent meta-analysis examining the weapons effect (Benjamin et al., 2018) suggested that although the mere presence of weapons appeared to reliably increase accessibility of aggressive cognition and hostile threat appraisals, the available literature suggested that the influence of the mere presence of weapons on aggressive behavioral outcomes was at best inconclusive. Although the basic mean effect size for the influence of weapons on aggressive behavior was noticeably positive, a battery of tests designed to adjust for the influence of publication bias showed the mean effect size could be close to zero. The meta-analysis concluded that weapons effect research involving behavioral outcomes in particular should be interpreted cautiously. Indeed the findings from Benjamin et al. (2018) are similar to those of other recent media violence meta-analyses employing similar methods of adjusting for the influence of publication bias (e.g., Hilgard, Engelhardt, & Rouder, 2017).

Although there is renewed skepticism about the validity of the line of research originally begun by Berkowitz and LePage (1967), there have been some recent successful attempts to demonstrate a weapons effect on aggressive behavioral outcomes. What these recent studies have in common is an effort to increase the ecological validity of the experimental settings and measurements. For example, Bushman, Kerwin, Whitlock, and Weisenberger (2017) found some evidence that individuals operating driving simulators containing guns were significantly more likely to drive aggressively (e.g., speed, follow other drivers too closely) than individuals operating driving simulators containing badminton racquets. Similarly, Ariel et al. (2019) found evidence that police officers in the City of London who had been randomly assigned to visibly carry Tasers

were significantly more likely to be assaulted by suspects than police officers who had been randomly assigned to not carry Tasers. Although each of these experiments has its limitations, including small sample (Bushman et al., 2017) and arguably small effect size (Ariel et al., 2019), these more ecologically valid experiments show a potential way forward for researchers interested in more thoroughly addressing this particular line of research. Finally, it is worth noting that controversy surrounding the validity of the weapons effect is embedded within a context in which there is renewed questioning about the replicability of classic research more generally (e.g., Open Science Collaboration, 2015). One weapons effect researcher recommended utilizing a registered replication report (RRR) approach to lab research on the weapons effect in which research protocols are preregistered, conducted across multiple labs, resulting in large enough samples to detect potentially small effect sizes with greater accuracy (Benjamin, 2019).

SEE ALSO: General Aggression Model; Hostile Media Effect; Questionable Research Practices: *p*-Hacking, Replication, and Fraud

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Arlin J. Benjamin, Jr. earned his PhD in Social Psychology from the University of Missouri–Columbia in 2000. He is currently an associate professor in the Department of Behavioral Sciences at the University of Arkansas–Fort Smith. His research concentrates on the question of the extent to which aggression-related situational cues (e.g., violent video games, weapon images) influence aggressive cognitions, behaviors, and aggression-related attitudes, as well as individual differences predicting aggressive behavior and attitudes toward violence. Increasingly, his work is concentrating on the validity of measures of aggression-related cognitive and behavioral outcomes.

EXHIBIT 60

8 Best AR-15 Foregrips [Hands-On]: Vertical & Angled

Want more control of your AR-15? We hands-on review some of the most popular options from traditional vertical grips to angled and even some special foregrips.

BY SEAN CURTIS , UPDATED DECEMBER 18, 2022 38 COMMENTS

The AR-15 market in the United States is saturated with just about every kind of accessory you might even think you'd need…everything from lights, bayonets, to even chainsaws.

Not a chainsaw…but still a fun upgrade!

But what about foregrips? What are some options for those?

Lucky for you, we're going to tackle that very subject…

And tell you about some great ones that are on the market, how to use them, and what they can do for you.

Best AR-15 Foregrips

So, let's jump in!

Table of Contents

What is an AR-15 Foregrip?

It can actually describe a pretty broad category of devices you add to the handguard in order to offer a different kind of grip.

When holding an AR-15, shooters typically hold the handguard under the bottom with their support hand in a cupping grip.

However, over the years different objects have been added to these handguards to change the way the support hand merges with the gun.

This is often based on the personal preferences of the shooter.

What Does It Do?

The general idea of the foregrip is to help you with recoil control.

While the AR platform chambered in .223 or 5.56 is not an untamable beast when you pull the trigger, rapid fire or full-auto variants can make it more difficult to control shot placement.

The concept of the foregrip is a handle, offering more resistance to recoil impulse than a round handguard, which allows you to snug the rifle harder into your shoulder.

You can also push foregrips into barricades to stabilize shooting positions.

In this article, I'm going to cover a few foregrip sub-categories: **vertical, horizontal, and special**.

Vertical foregrips are pretty common and they are essentially a bar mounted to the

Referred to as the "broomstick" in the military, the vertical foregrip has come in a few different variations and they offer some distinct advantages.

AR-15 Slidefire, Lisa Jean

Horizontal is a category that means the grip typically runs more along the bottom of the handguard, but it still manages to give you more of a grip to pull the rifle into your shoulder.

Special grips are exactly that. They may base their design on one of the above categories but are different enough to warrant a special section of their own.

Best Vertical Grips & Foregrips

1. Daniel Defense Vertical Grip

This **vertical grip** is an excellent choice. Made of polymer, it comes in different colors and will work with Keymod or M-LOK so you can pick the one that works best for your rifle.

A prime example of the vertical foregrip, it is shaped to fit the hand with rounded edges and flat sides.

Daniel Defense Vertical Grip

It's 3.25-inches tall and 2-inches wide, so it fits most hands.

Shooters with larger mitts will feel like their hand is hanging off a bit but they will still have good purchase.

This grip points straight down and allows the shooter to grab it and pull the rifle into the shoulder more firmly.

In the next photo, you can see a variant of the traditional broomstick grip, more of a ¾ grip where the bottom of the handguard is still used, but the grip provides resistance to the rear.

Daniel Defense Vertical Grip

Shooters using this grip will notice a difference in controlling the recoil impulse. A sight picture is typically not that tough to reacquire when using the grip to pull the buttstock into your shoulder.

In addition, it changes the ergonomics of the support arm causing a bit less strain on the wrist than a traditional cupping grip on the handguard.

GOLD STANDARD IN VFG

Daniel Defense VFG

32
at Daniel Defense
Prices accurate at time of writing

32 at Daniel Defense

- Daniel Defense (See Price)
- Brownells (See Price)
- Optics Planet (See Price)

2. Magpul M-LOK MVG

The **Magpul version** of the vertical grip is very similar to the Daniel Defense, though a bit more rounded.

It too is made of polymer, comes in a variety of colors and can mount right up to your rail. Where you mount the grip can dictate how you hold it.

This can be changed with the amount of real estate you have on your handguard.

Magpul VFG

The MVG is similar in almost all ways to the Daniel Defense grip though I noticed the M-LOK hardware was a bit beefier and the price is much less.

Shooters using this old broomstick style hold have to be careful that they are pulling directly back into the shoulder, otherwise shot placement can suffer.

Magpul VFG

I enjoy shooting with a vertical foregrip, though I do not use the traditional broomstick shooting style.

Both of these grips are great choices for long shooting days (training) if you don't have a sling as they held you distribute the weight of the rifle while you are in low ready, or just resting the weapon muzzle down.

Magpul VFG

12
at Brownells
Prices accurate at time of writing

12at Brownells

- Brownells (See Price)
- Palmetto State Armory (See Price)

Horizontal or Angled Grips

Another variety of the foregrip is horizontal or angled grips. Serving the same purpose, these grips are a bit more stretched out but still offer the same advantages of the vertical grips in different ways.

3. Magpul Angled Fore Grip (AFG)

The **AFG** is another great polymer option from Magpul that answers the same riddle with a different approach.

Shooters will note the same traditional grip on the bottom of the handguard, though it angles the hand down a bit.

This subtle change makes the wrist bend slightly less, creating a more ergonomic placement.

Magpul AFG
Shooters who prefer thumb-over-bore will find the AFG is a great addition.

Some other benefits are that it cups the hand and gives you reference points.

You can also pull back and develop some good shoulder pressure with the rear bumper—improving recoil recovery for follow-up shots

Magpul AFG
The front bumper can be jammed into barricades as a stabilization point for that type of shooting as well.

This grip is a great value and comes in different styles with as many as **five different colors**.

Magpul AFG M-LOK

25
at Palmetto State Armory
Prices accurate at time of writing

25 at Palmetto State Armory

- Palmetto State Armory (See Price)
- Brownells (See Price)
- Rainier Arms (See Price)

4. Strike Industries LINK Curved Foregrip

The **SI Curved Foregrip** is a great choice for those who like a more traditional grip position for the support hand.

The bumpers cup the hand really well and allow the gun to be driven forward as well as pulled back into the shoulder.

The inside of the foregrip is serrated and allows for **great** retention.

Strike Industries LINK Curved Foregrip

Strike Industries is known for some cool innovations and this foregrip does not disappoint.

It comes with the Link system which allows it to be mounted to either M-LOK or Keymod. Made out of coated aluminum, the Link is tough and very lightweight.

Strike Industries LINK Curved Foregrip

BEST ANGLED FOREGRIP

Strike Industries LINK

31
at OpticsPlanet
Prices accurate at time of writing

31at OpticsPlanet

- OpticsPlanet (See Price)
- Brownells (See Price)

Special Grips

At least a couple of products currently on the market defy specific categorization because of their approach to accomplishing the same mission of the foregrip.

5. Ryker Grip

The **Ryker Grip** represents a complete departure from the traditional methodology.

The developers at Ryker studied the body mechanics of shooting and moving a rifle. They then created a product that has a lot of shooters scratching their head — until they try it.

Ryker Grip

The guys at Ryker have some interesting military backgrounds and they have done some testing with active-duty military who have given them feedback.

Also, the National Tactical Officers Association (NTOA) recently gave the thumbs up to the Ryker Grip so even though it looks totally different, some serious shooters have given it the nod.

Ryker Grip

The basic concept is that it serves as an ergonomic grip which mounts on the side of the rifle.

This places the thumb up, and palm in, toward the rifle. Having used this unorthodox grip, I can tell you it removes a lot of the binding that happens in the wrist and forearm.

Shooters can *drive* the gun with surprisingly better accuracy and speed.

Ryker Grip
The Ryker is made of polymer and is tough.

It currently must mount on a side Picatinny rail, sadly that limits what handguards can use it. It is reversible so lefties need not despair.

Ryker Grip

74
at Ryker USA
Prices accurate at time of writing

74 at Ryker USA

6. Mid-Evil Industries 360 VFG

The **360 VFG (vertical foregrip)** is a great evolution of the traditional broomstick.

The unit mounts to your rail like a standard grip, but that's where the similarities end.

With a twist of the bottom portion of the shaft, the upper portion loosens and can rotate.

Mid-Evil Industries 360 VFG
You can curve the 360 VFG back, forward, and even out to the side.

You can hit just about any angle as it rotates on a ball pivot at the base. Once you have it in the position you like, simply tighten the end and it locks into place.

Mid-Evil Industries 360 VFG
The whole unit is made of aluminum, weighs 5.2 ounces, and measures 3 7/8-inches long.

The end of the grip can unscrew exposing the hollow handle for battery storage. It comes in four colors and is available for Picatinny, Keymod, and M-LOK!

Mid-Evil Industries 360

99
at OpticsPlanet
Prices accurate at time of writing

99at OpticsPlanet

- OpticsPlanet (See Price)
- Rainier Arms (See Price)
- Palmetto State Armory (See Price)

7. Bravo Company KAG

Developed by BCM in conjunction with Travis Haley (Haley Strategic Partners), the **Kinesthetic Angled Grip** is a minimalist approach that brings maximum results.

The KAG reminds me of a comma and it is every bit as useful.

This small grip has a foot firmly planted in the horizontal *and* vertical foregrip worlds.

Mounted on the bottom of your handguard, the KAG serves as a great reference point for the back of your hand.

Bravo Company KAG
It is so small, you hardly notice its presence but it is extremely comfortable.

It cups the back of your hand and also angles it down slightly, releasing some of the binding that happens in the joints when you raise a file.

Bravo Company KAG (2)
Despite its small size, it holds enough of your hand to allow you good backpressure, pulling the rifle snugly into your shoulder.

With the KAG you can shoot a traditional support grip (albeit more ergonomic) or a thumb-over-bore.

The KAG comes any color you want, as long as that color is black.

BEST BARRICADE STOP

Bravo Company KAG

18
at Brownells
Prices accurate at time of writing

18at Brownells

- Brownells (See Price)
- Primary Arms (See Price)

- OpticsPlanet (See Price)

8. Tyrant Designs Mod Foregrip

A newcomer that just looks so good…and performs as well.

Tyrant Modded AR-15

The **Mod Foregrip** from Tyrant Designs definitely pops out and gives you a very nice and secure grip with its rubberized texture over the milled aluminum.

Tyrant Mod Foregrip
When you want a full grip foregrip that stands out...

Tyrant Design Mod Foregrip

64
at Tyrant Design
Prices accurate at time of writing

64 at Tyrant Design

- Tyrant Design (See Price)
- Optics Planet (See Price)

Final Thoughts

There are so many great options out there when it comes to mounting a foregrip to your handguard.

Ultimately, you have to decide which will work best for you, and the only way to truly know that is to try them.

I have used all the above products and find them to be excellent. Depending on your use of your rifle, you may find one that is a great fit for you too.

Regardless, if you get one and like it, you need to train with it!

So…what is your favorite foregrip? Tell us about it in the comments! Once you have a foregrip – you'll want to grab some other upgrades for your rifle! So, check out our articles on the 5 Best AR-15 Flashlights, Best AR-15 Handguards, and the Best AR-15 Upgrades.